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THE LABOR INCOME TAX EQUIVALENT OF
PRICE SCISSORS IN PRE-REFORM CHINA

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October 1998

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Price Scissors in Pre-Reform China

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The Labor Income Tax Equivalent of Price Scissors in Pre-Reform China

Abstract

The government in a centrally planned economy can raise investable resources through price and wage manipulation. By treating price and wage controls as an implicit form of labor income taxation, I have assessed the scale of resource transfers from households to the government in pre-reform China. From the observed rise of the labor income share in the non-agricultural sector output resulting from price and wage liberalization since 1979, the implicit tax revenue during the 1964-78 period is assessed as 10.1% of GDP. According to estimates based on a two-sector model, this implicit labor income tax led to implied reductions of 33.1% and 36.7%, respectively, in the price of agricultural goods and in the non-agricultural-sector nominal wage during the 15-year period. The equivalent average labor income tax rates were 18.2% and 21.1% for agricultural and non-agricultural sector workers of the time. (JEL classification: H24, P22)

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The Labor Income Tax Equivalent of Price Scissors in Pre-Reform China

I. Introduction

It is an established view that the government in a centrally planned economy, particularly those in the early periods of economic development, can mobilize resources for industrial investment through price and wage (terms of trade) manipulation. This view is known as the "scissor problem" in economic development, and the Soviet Union under Stalin's rule has been cited as an example.¹ In a number of Soviet-type economies of the recent past, the government owned and managed the bulk of non-agricultural sectors, collectivized the agricultural sector, coordinated production and distribution through state plans, and narrowly limited the scope of markets. State ownership in non-agricultural sectors alone would have provided the government with proprietor's income available for reinvestment. Under this institutional environment, however, the government has become a semi-monopolist and monopsonist in goods and factor markets. Market-controlling power has brought about another important revenue source. The government could raise revenues by selling non-agricultural goods at higher prices to households, and by purchasing from them agricultural goods and labor at lower prices than the (notional) competitive market prices. Elaborate and pervasive price and wage controls commonly observed in Soviet-type economies, therefore, may have served well as an instrument to channel resources from households to the state in lieu of an explicit personal income tax system.

Price and wage manipulation appears to be at the core of Communist China's capital accumulation during the pre-reform period

prior to 1979.² The objective of this study is to measure the approximate magnitude of resource transfers in China's recent past. A few statistics from the pre-reform period suggest that the government revenue raised through the scheme may have been substantial: (i) the state industrial sector earned high profits; (ii) in the absence of personal income taxes, the state revenue share of GDP was high while the personal consumption share was low; and (iii) the income of the rural population was low and its growth slow.³ The conventional view of China's capital accumulation well recognized the role of the rural surplus channelled to the state through price scissors during the pre-reform period.⁴ Yet little attention was paid to depressed urban workers' wages as another potential sizable state revenue source.⁵ Consequently, empirical studies on price scissors in China to date (Ishikawa, 1966; Nakagane, 1989; and Sheng, 1993a and b) focused on the measurement of the rural to urban resource flows.⁶

Recent works on the theoretical analysis of price scissors (Sah and Stiglitz, 1984 and 86; Blomqvist, 1986; Carter, 1986; and Knight, 1995), which apply general equilibrium frameworks, have clarified the mechanics behind the intersectoral resource flows when prices and wages are controlled by the government.⁷ A notable finding derived from two-sector (urban and rural) general equilibrium models is that the government policy to raise investable resources by lowering the relative price of agricultural goods inevitably entails the reduction of urban wages. Because this wage suppression generally lessens urban workers' welfare, they also bear the burden of financing government industrialization programs.

In view of these developments in theoretical analysis, I incorporate wage controls in urban areas as an integral part of the

accumulation scheme in this study. To be considered here are the resource transfers from households (comprising urban and rural workers) to the state, which are broader than those from the rural to the urban sector. The approach adopted is to treat price and wage controls as an implicit form of labor income taxation and to measure the equivalent labor income tax rates for the agricultural and non-agricultural work forces. The time period under study is the fifteen years from 1964 to 1978. This largely coincides with the period after the recovery from the Great Leap Forward (1958-60) until the beginning of economic reforms (December 1978). During this period, China's leaders promoted rapid industrialization based on a semi-autarkic development strategy under "classical socialism" (Kornai, 1992).⁸ This study makes use of the reconstructed annual national income accounts data (the CASS data) prepared by a group of economists at the Chinese Academy of Social Sciences.⁹ While the official annual national accounts data compiled by the State Statistical Bureau are available since 1978, the CASS data dates back to the period covered in this study. Hereafter, "rural" and "agricultural" may be used interchangeably, as with "urban" and "non-agricultural".

The measurement procedure begins by assessing the amount of government revenue raised from the implicit labor income taxation for each year in the 1964-78 period. An eight-equation command economy model has been constructed to account for intersectoral resource flows. This model can be solved for the agricultural goods price and the non-agricultural-sector wage required to fulfill a given government's revenue target for the implicit labor income tax. The model is employed to derive the implied (undistorted) agricultural goods price and non-agricultural-sector wage at a hypothetical zero

implicit tax revenue case for each year in the 1964-78 period. These are higher than the observed (distorted) price and wage through the 15-year period when implicit tax revenues were substantial. The differences in the price and wage, between those at the hypothetical zero tax revenue case and the observed, indicate the implied magnitude of reductions (distortions) in the agricultural goods price and the non-agricultural-sector wage for the 15 years. The rate of decline in real hourly labor income of the agricultural and non-agricultural work forces associated with the price and wage reductions represents the equivalent average labor income tax rates of the implicit taxation system.

A caveat to this approach is that the implied agricultural goods price and non-agricultural wage at zero implicit labor income tax revenue should not be equated with those prices and wages that would prevail in the absence of wage and price controls (hence qualified as "implied"). The estimation approach in this paper is analogous to measuring the average personal income tax rate from the tax revenue raised and pre-tax personal income in an economy. Pre-tax income would be different generally if no tax were imposed, because of excess burdens. Although price and wage controls must have sizable excess burdens by affecting individuals' choice between labor and leisure, the model adopted omits this element. The exercise is intended to assess the scale of resource transfers in the form of implicit taxation and trace the revenue sources to two kinds of labor income.

II. Resource Flows Under the Sah-Stiglitz-Knight Model

Economic systemic features, the relatively large agricultural sector,

and the mode of industrialization strategy adopted in pre-reform China match well the setting of the Sah-Stiglitz-Knight two-sector general equilibrium model.¹⁰ The Chinese government of that time could in theory raise sizable resources for industrial investment by lowering household real income through price and wage manipulation. Assuming it did, one can trace the resource flows associated with implicit taxation in a simplified form according to the Sah-Stiglitz-Knight model.

The process begins with the government setting a high target for state industrial investment. In order to secure investable resources, the government must preempt a high proportion of urban output, a level beyond that which its proprietor's income would yield under competitive factor markets. For this purpose, the government lowers the urban wage to reduce the total wage payment. With a state monopoly in the urban sector, the wage payment share of urban output value represents the proportion of urban goods made available for households. Less urban goods being available for purchase by urban and rural workers, the relative price of rural goods must fall to clear the markets of the two goods.¹¹ The government lowers the price of rural goods accordingly. At the new low urban wage and rural goods price, government revenue, in the form of urban goods, increases. Rural workers' (farmers) real income decreases reflecting the price fall of rural goods produced. Urban workers' real income also decreases when the wage reduction is large enough to outweigh the purchasing power gain from the fall of rural goods price.

Following Knight's diagrammatic exposition, Figure 1 represents the resource flows with the offer curves in regard to households comprising two kinds of workers.¹² Agricultural workers' endowment is

measured on the vertical axis and non-agricultural workers' on the horizontal axis. The vertical distance (O_AO) denotes agricultural output net of the agricultural tax. The horizontal (OO_I) distance represents non-agricultural workers' wages paid in kind (non-agricultural goods), in the absence of the implicit labor income taxation.¹³ The offer curves of the agricultural (OC_A) and non-agricultural (OC_I) sectors are assumed to have familiar curvatures. The competitive equilibrium is at point a , where the agricultural sector sells Oz of agricultural goods for Or of non-agricultural goods, and the non-agricultural sector buys Oz of agricultural goods for Or of non-agricultural goods. The slope of the ray from the origin (Oa) indicates the terms of trade, and at a the indifference curves, W_1 and W_1' , represent the highest achievable indifference curves of, respectively, the agricultural and non-agricultural workers.

Now the government imposes arbitrary prices and wages in order to divert part of non-agricultural goods from households to the state for industrial investment. The new government-set terms of trade, which is unfavorable to the agricultural sector, is indicated by the slope of the ray, Oc . With the new terms of trade, the agricultural sector sells Oy of agricultural goods for Oq of non-agricultural goods at b . The new indifference curve, W_2 at b is lower than W_1 at a : indicating the fall in farmers' welfare. The non-agricultural sector, however, would choose to sell Os of non-agricultural goods for Ox of agricultural goods at c at the new terms of trade. The government eliminates the excess demand for agricultural goods (xy) and the excess supply of non-agricultural goods (qs) by lowering the wages of non-agricultural sector workers. As their real income falls, non-agricultural workers move along the income-consumption path (IC_1) from

c to d. The indifference curve (W_2') at d indicates a new lower welfare level of non-agricultural workers compared with W_1' at a. With agricultural and non-agricultural workers consuming, respectively, Oq and O_1t of non-agricultural goods, the government appropriates the remainder (qt) for industrial investment. It is clear from the figure that the implicit labor tax revenue (qt) originates from real income reductions of agricultural workers (associated with the move from a to b) and non-agricultural workers (from a to d). The approximate tax revenue raised (qt) in pre-reform China will be assessed in the next section.

III. The Size of the Implicit Tax Revenue

To the extent that China's industrialization drive was financed by the implicit labor income tax, as shown above during the pre-reform period, the observed labor share of non-agricultural sector output must have been depressed to a low level. Such an observed share would have deviated downward from the underlying output share elasticity of labor in the non-agricultural sector, which would have revealed itself in the absence of wage and price controls. The underlying output share elasticity of labor would have been higher than the observed labor share. If the first were known, the difference between the two would represent the scale of implicit taxation.

The starting point of the measurement procedure is to obtain a proxy value for the underlying output share elasticity of labor in the non-agricultural sector from the data during the reform period. Under economic reforms since the late 1970s, the Chinese government has since decontrolled prices and wages, decollectivized the agricultural

sector, and dismantled state monopolies in the industrial and service sectors by encouraging the entry of non-state enterprises.¹⁴

Consequently, the elaborate price and wage control system in the pre-reform period collapsed in the 1980s, giving way to market forces to set prices and wages. The effect of this loss manifested itself in the sharp fall in the share of GDP of state industrial enterprises' pre-tax profits as well as in the drop in the share of GDP of state revenues, from 21.8% and 31.2% in 1978 to 8.1% and 15.8% in 1990, respectively.¹⁵ The observed labor shares of the non-agricultural sector in the late 1980s and 1990s, therefore, appear to represent an approximate "output share elasticity of labor" benchmark to assess the extent of implicit labor income taxation during the pre-reform period.

With the CASS factor income data and official Chinese statistics, which is expressed in 1978 prices, one can compute labor income separately for the agricultural and non-agricultural sectors.¹⁶ The labor share of non-agricultural output (value-added) obtained (see Table 1 and shown graphically in Figure 2) indicates that the labor share has been relatively low throughout the period since 1964; 45.2% in 1989 is the highest.¹⁷ There is a large gap between the pre-reform period and the decade to 1995, however. The labor share of the non-agricultural sector appears to be quite low during the 1964-78 period with a mean of 27.4% (γ in Figure 2) when strict price and wage controls were in force. At its bottom, the share was not more than 25% from 1970 to 1975, the years between the climactic part of the Cultural Revolution (1967-68) and the death of Mao (1976). The labor share, however, rose continuously from 1979 to 1984 and stayed at relatively high levels, between 39.0% and 45.2%, since the mid-1980s. The timing of the share increase coincides roughly with successive

price and wage decontrol during economic reforms. The sharp rise in the labor share and its timing lead one to suspect that the wage levels in the non-agricultural sector were indeed systematically depressed during the pre-reform period.

If one assumes the Cobb-Douglas technology in China's non-agricultural sector and considers the known proclivity of observed labor shares to fluctuate (counter-cyclically to output) in the short-term, the non-agricultural sector's mean labor share in recent several years may be accepted as the underlying output share elasticity of labor in China's non-agricultural sector. I have chosen, therefore, the (arithmetic) mean of labor share in the non-agricultural sector in the eight-year period ending in 1995 (1988-95, 41.9%, β in Figure 2) as this sector's underlying output share elasticity of labor. In other words, in approximate terms over 15 years, non-agricultural workers would have been paid 41.9% of value-added as their labor income instead of the observed 27.4%, if no implicit tax revenue had been raised through price and wage controls in the 1964-78 period. One can consider the difference in wage payments in the non-agricultural sector over 15 years as the implicit labor income tax revenue from price and wage controls in the 1964-78 period.

Such is the assumption of Table 2; the fourth column indicates what non-agricultural labor income would have been at zero implicit tax revenue. Table 2 lists the implicit labor income tax revenue as the difference between the observed and the hypothetical zero-tax revenue case (fifth column), and it then tabulates the tax revenue shares of non-agricultural value-added and the GDP for the 15 years (sixth and seventh columns). For the entire period, the tax revenue's non-agricultural value-added and GDP shares were, respectively, 15.4%

and 10.1%. These numbers are higher in the 1970-78 period (16.7% and 11.3%) than in the 1964-69 period (11.2% and 6.6%). Because state fixed investment accounts for around 10 to 20% of GDP during the 15-year period (eighth column; mean, 15.8%), most of it was in essence financed by the implicit tax on labor income. The close association is also confirmed if the trends of two variables over the 15-year period are compared; the increase of state fixed investment's GDP share was roughly matched by that of implicit tax revenue's GDP share over time. This short review suggests that the Chinese government raised sizable revenues from implicit labor income taxation through price and wage controls and such revenues contributed to the industrialization drive in the pre-reform period.

IV. The Model

In order to assess implied price and wage distortions and equivalent labor income tax rates from the tax revenue estimates during the pre-reform period, I have constructed a two-sector (agricultural and non-agricultural) model, which accounts for the resource flows in a command economy. The model's endogenous variables include the output of two goods (agricultural and non-agricultural goods), the two separate nominal hourly labor income (wages) in the two sectors, and the agricultural goods price.

Notation

Numerical subscripts -1 denotes the previous year. Δ denotes the annual increment. Endogenous variables are represented by capitals; exogenous variables are indicated by either lower case or Greek

letters.

Endogenous variables:

- G Nominal government revenue.
- I Output of non-agricultural goods (in 1978 prices).
- K_I Capital stock in the non-agricultural sector (year end in 1978 prices).
- P_o Price of agricultural goods (1978 level = 1).
- Q Output of agricultural goods (in 1978 prices).
- W_I Nominal hourly labor income (wage) of workers in the non-agricultural sector.
- W_o Nominal hourly labor income (wage) of workers in the agricultural sector.
- Y GDP (in 1978 prices).

Exogenous variables and coefficients:

- k_o Capital stock in the agricultural sector (year end in 1978 prices).
- n_I Labor input in the non-agricultural sector (hours worked).
- n_o Labor input in the agricultural sector (hours worked).
- p_I Price of non-agricultural goods (1978 level = 1).
- t Time trend.
- x Agricultural tax (in 1978 prices).
- z Current government expenditure (in 1978 prices).
- β Output share elasticity of labor in the non-agricultural sector.
- γ Share of non-agricultural goods output made available for purchase by households. Also the proportion of non-agricultural value-added distributed to non-agricultural workers (labor share coefficient).
- θ Households' expenditure share of agricultural goods in 1978.
- λ Rate of depreciation.

Equations

$$Q = a_Q e^{\mu t} n_Q^\alpha k_Q^{1-\alpha}, \quad (1)$$

$$0 < a_Q, n_Q, k_Q \quad 0 < \alpha < 1,$$

$$I = a_I e^{\tau t} n_I^\beta K_I^{1-\beta}, \quad (2)$$

$$0 < a_I, n_I, K_I \quad 0 < \beta < 1,$$

$$\ln \gamma I = \delta_0 + \delta_1 \ln \left[\frac{P_I}{\theta P_Q + (1 - \theta) P_I} \right] + \delta_2 \ln [(Q - x) + \gamma I], \quad (3)$$

$$0 < P_I, x \quad 0 < \gamma \leq \beta \quad \delta_1 < 0 \quad 0 < \delta_2 \quad 0 < \theta < 1,$$

$$W_Q = \frac{P_Q (Q - x)}{n_Q}, \quad (4)$$

$$W_I = \frac{\gamma P_I I}{n_I}, \quad (5)$$

$$G = (1 - \gamma) P_I I + P_Q x, \quad (6)$$

$$\Delta K_I = (1 - \gamma)I - z - \lambda K_{I-1}, \quad (7)$$

$$0 < z \quad 0 < \lambda < 1,$$

$$Y = Q + I. \quad (8)$$

Equations (1) and (2) are the Cobb-Douglas production functions in the agricultural and non-agricultural sectors; inputs are labor and capital. Equation (3) is the household demand function of non-agricultural goods in which δ_1 and δ_2 indicate the price and income elasticities. γI represents non-agricultural goods made available for purchase by households (LHS) as well as the wage payment for non-agricultural workers (expressed in 1978 non-agricultural goods price, third term). The bracket in the second and third terms on the right-hand side are, respectively, the relative price of non-agricultural goods and real household disposable income. Households in this economy, which comprise agricultural and non-agricultural workers, spend all income to purchase two goods.¹⁸ In the model, Equation (3) determines the agricultural goods price (P_a) given the exogenously-set non-agricultural goods price (p_r).¹⁹ When the government expands investment through implicit labor income taxation, the labor share coefficient, γ , is depressed from the underlying output share elasticity of labor (β) in the non-agricultural sector in Equation (2). In this case, with a plausible size of income elasticity, the government must adjust downward the agricultural goods price to clear the markets of the two goods.²⁰

The agricultural sector in this economy consists of collective farms. Equation (4) indicates that, after paying a small sum for an agricultural tax, agricultural output is fully distributed as income of the member farmers according to hours worked. Equation (5) is the wage-setting rule of the state-controlled non-agricultural sector. When the implicit tax is in force, γ is lower than β and workers are paid less. The value of non-agricultural output that the government obtains by underpaying the workers, $(\beta - \gamma)p_I I$, represents the government's implicit tax revenue. Note that this implicit tax term vanishes if the share coefficient (γ) is set equal to the underlying output share elasticity of labor (β). The government revenue consists of the value of non-agricultural output net of wage payments (first term) and the agricultural tax (Equation 6). Non-agricultural goods kept by the government, $(1 - \gamma)I$, would be used for investment in capital stock and for government consumption (Equation 7). Equation (8) defines this economy's GDP. This recursive model fully determines the eight endogenous variables.²¹

V. Estimation

The non-agricultural sector's observed labor income shares (γ) in the 1964-78 period and an estimate of its underlying output share elasticity of labor ($\hat{\beta} = 0.419$) are available (Table 1). Estimation of Equation (3) would yield three unknown coefficients. With available data and coefficient estimates, one can obtain the alternative values of the agricultural goods price and agricultural and non-agricultural hourly labor income (wages) when the implicit tax revenue is reduced to zero, by substituting β for γ in Equations (3) and (5). The

percentage deviations of these alternative values from the observed would indicate the implied price and wage distortions associated with the implicit taxation. Also, the computed rates of reduction in the purchasing power of hourly labor income in the agricultural and non-agricultural sectors would represent the labor income tax equivalent of price and wage distortions. Note that estimation relies on highly aggregated national income data. For instance, the prices of two goods are represented by sectoral GDP deflators. Labor income data used includes in kind income and non-wage benefits. See the Appendix for the details of the data.

A. Estimation of the Household Non-Agricultural Goods Demand Function

Three annual data series are used to estimate Equation (3), the household demand function for non-agricultural goods: (i) household non-agricultural goods purchase (γI , 1978 prices) (ii) the relative price of non-agricultural goods (PIX , base year = 1978), and (iii) real household disposable income (HDY , 1978 prices). In order to confirm the stationarity of the time series, I have performed the Augmented Dickey-Fuller test for a unit root on the natural logarithms of the three variables. Because all three variables are found to be $I(1)$, the Engle-Granger cointegration test was employed to consider whether Equation (3) represents a cointegrating vector. The test results indicate that the three variables are cointegrated when the sample period is relatively long.²² Equation (3), the cointegrating vector, is estimated by OLS with the 1964-92 data.²³

$$\ln \gamma I = -1.825 - 0.909 \ln PIX + 1.193 \ln HDY, \quad (3)'$$

(-14.786) (-8.167) (48.396)

Adjusted $R^2 = 0.999$ D.W. = 1.499 Period = 1964-92.

The numbers in parentheses are t statistics.

The price and income elasticities estimated, -0.909 and 1.193, have anticipated signs and are highly significant statistically.

B. Implied Price and Wage Distortions

With the estimated coefficients of Equation (3), one can solve Equations (3), (4), and (5) for the alternative set of values of the agricultural goods price (P_0) and the nominal hourly labor income in the agricultural (W_0) and non-agricultural (W_1) sectors. In order to obtain the values of these three endogenous variables under the zero implicit tax revenue case, γ in Equations (3) and (5) are replaced by $\hat{\beta}$. The implied values obtained for the zero tax revenue case are higher than the observed. When the implicit tax revenue was reduced to zero, the quantity of non-agricultural goods made available for purchase by households, the non-agricultural sector hourly wage, and therefore this sector's wage payments, would grow. Accordingly, the agricultural goods price must rise to clear the markets in two goods.

Table 3 illustrates how the agricultural goods price and the terms of trade (the relative price of agricultural goods in terms of non-agricultural goods) rise in response to the increase in non-agricultural goods made available for purchase (from column one to two). The observed values of P_0 (agricultural goods price) and p_1 (non-agricultural goods price) are the GDP deflators for the agricultural and non-agricultural sectors. The alternative agricultural goods price and the terms of trade in the 1964-78 period are in the fourth and seventh columns, respectively. The markedly high implied agricultural

goods price under the zero tax revenue case attests that the government lowered the terms of trade substantially to impose the implicit tax. The implied rate of deterioration of the terms of trade (eighth column) ranges from 20% to 40%.

Table 4 lists the hourly labor income (wages) of workers in the agricultural and non-agricultural sectors under the two cases. Because the agricultural sector was by far the largest employer in the pre-reform period, total hours worked in the agricultural sector was much larger than in the non-agricultural sector. The data indicates that the observed hourly wage in 1978 prices in the non-agricultural sector was roughly twice as high as that in the agricultural sector during the second half of the 15-year period (third and sixth columns). The implied hourly wages under the zero implicit tax case are indicated in the fourth and seventh columns. These two columns show how the observed wages would increase in nominal terms. The two series are then adjusted for the loss of purchasing power from the higher agricultural goods price to compute the implied real hourly wages (see the fifth and eighth columns), which are comparable with the observed wages.²⁴ This explains why the "real" series are lower than the "nominal" ones. The implied real wages in the two sectors are significantly higher than the observed ones, indicating that the government reduced real wages to raise the implicit tax revenue during the period. One can also confirm with the real wage series that the removal of the implicit labor tax burden would not greatly affect the wage gap between the two sectors.

C. Average Labor Income Tax Rate Equivalent

The percentage decrease in real hourly labor income from the zero tax

revenue case to the observed represents the equivalent average labor income tax rate of the implicit taxation. This is named as the "implicit labor income tax rate" and reported in Table 5. In the first column, the rate of decrease (minus sign) in the agricultural sector nominal hourly wage is the same as the implied rate of deterioration of the terms of trade for this sector. The rate of decrease in the non-agricultural sector nominal hourly wage is in the second column. Because the fall in the agricultural goods price associated with implicit taxation brings about a compensating increase in purchasing power (third column), the implicit labor income tax rates (fourth and fifth columns) are smaller than the first and second columns for workers in both sectors. For the entire 15-year period, the tax rate for non-agricultural sector workers, at 21.1%, is a few percentage points higher than that for agricultural sector workers, at 18.2%. For the two sectors together, the mean tax rate was 19.9% (sixth column).²⁵ Considering the low income levels of the working population, one may conclude from these numbers that the tax burden was rather high.²⁶

Note that, during the 1964-69 period, the agricultural sector workers' tax rate (16.6%) was higher than the non-agricultural sector workers' (11.3%), and this is reversed in the 1970-78 period as the tax rates rose in the two sectors (to 19.0% and 25.9% respectively). During the climactic part of the Cultural Revolution (1967-68), the Chinese economy experienced sharp declines in aggregate output (real GDP growth rate: 1967, -7.2%; 1968, -6.5%, from Table 2) when political disturbances disrupted production in non-agricultural sectors. This resulted in sudden contractions of state fixed investment (GDP share: 1966, 13.7%; 1967, 10.8%; and 1968, 9.2%, from Table 2) and of the estimated implicit tax revenue (GDP share: 1966,

9.3%; 1967, 6.1%; and 1968, 3.8%, from Table 2). In the face of the fall in output during these two years, the government appears to have chosen to temporarily accept a smaller non-agricultural output value share for state revenue. In 1967 and 1968, therefore, the non-agricultural sector's labor income share rose (1966, 26.8%; 1967, 31.4%; and 1968, 35.1%, from Table 1) and its labor income tax rates fell (1966, 17.8%; 1967, 9.9%; and 1968, 5.5%). Because the non-agricultural sector's implied wage and the implied price of agricultural goods generally move together, the tax rates for agricultural sector workers also fell (1966, 22.5%; 1967, 16.0%; and 1968, 10.1%).

Following the economic recovery from the deep slump until the end of the Cultural Revolution in 1976, the Chinese government accelerated industrial development centered on investment in heavy industry in the state sector. The higher than 20% mean tax rates from 1970 to 1975 appear to be associated with the government's imperative to secure resources to accelerate industrial investment. The increase in implicit tax revenue during this period imposed a heavy burden on non-agricultural sector workers. The reversal of the height of tax rates in the two sectors from 1970 has mainly to do with the size of the income effect in Equation (3). The negative income effect of the implicit taxation through the reduction of wage payments in the non-agricultural sector (third term on the right hand side) became more pronounced as the mean tax rate rose. Consequently from 1970, the required reduction of the agricultural goods price to clear the non-agricultural goods market (in the second term) grew slower than the increase in the mean tax rate. To the extent that the fall in the price of agricultural goods was restrained, the implicit tax rate for

agricultural sector workers also grew slowly.

The last two columns of Table 5 indicate the division of the implicit tax payment between the two sectors. Through price scissors, agricultural sector workers paid 53.4% of the implicit tax revenue raised during the 1964-78 period. Non-agricultural sector workers paid the rest (46.6%) through wage reductions. The ratio for agricultural sector workers was particularly high during the 1964-69 period, at 69.8%, when the implicit labor income tax rate in their sector was higher than in the non-agricultural sector. There appears to be little doubt that farmers in China bore a heavy burden for industrial development.

The implicit tax rate for agricultural sector workers looks particularly onerous if the large hourly wage gap between the two sectors is considered. Although the implicit labor income taxation through terms of trade manipulation must have exacerbated rural poverty, it may not be among the main reasons for the observed two-to-one hourly income gap in the 1970s. Because the tax rates are similar between the two sectors, the income difference would not narrow much if government tax revenues were reduced to zero. It is conceivable that the excess burden on farmers associated with implicit taxation was high relative to workers in non-agricultural sectors. However, an excess burden of the magnitude required to generate the observed income difference is unimaginable. The main reasons for the income gap are more likely to have been the strict migration controls and high level of industrial investment during the pre-reform period. Because of these policies, the marginal value product of labor in the non-agricultural sector remained significantly high relative to the agricultural sector. Needless to say, various organizational

characteristics of collective farms, which weakened work incentives, were partially responsible for the low labor productivity in the agricultural sector.²⁷

VI. Conclusion

It has been argued that the government in a Soviet-type economy can raise resources for industrial investment through price and wage manipulation. The Soviet Union during Stalin's rule has been accepted as an example. Although the theoretical case for the proposition appears to be solid, measuring the scale of resource transfers involves difficulties typically associated with incomplete data and with modeling the underlying structure of a command economy. Taking advantage of recent theoretical analysis of price scissors applying general equilibrium frameworks and of Chinese national income accounts data recently becoming available, I have assessed the resource transfers in pre-reform China for the 1964-78 period by treating the government's price and wage controls as an implicit form of labor income taxation.

The observed labor income share in non-agricultural output value during the 1988-95 period, by which time the government had largely abandoned price and wage controls, is used as the underlying output share elasticity of labor in the non-agricultural sector during the earlier period from 1964 to 1978. Because the observed labor income share during these 15 years was significantly lower than the above share elasticity, the difference can be attributed to implicit labor income taxation through wage reductions. The wage reductions corresponding to this labor share difference represents the value of

non-agricultural goods diverted from household consumption to the state for industrial investment. The estimated implicit labor income tax revenue amounts to 10.1% of GDP during the 1964-78 period. Making less non-agricultural goods available for households by implicit taxation, the government must keep the relative price of agricultural goods in terms of industrial goods (terms of trade) low to clear the markets of the two goods. The terms of trade deterioration reduces the real income of agricultural-sector workers, and they too bear the implicit tax burden.

With a two-sector model to account for the intersectoral resource flows, I have obtained an alternative set of price and wage levels when the implicit tax revenue is reduced to zero, for comparison with the observed price and wage levels. The implicit labor income taxation led to implied reductions of 33.1% and 36.7%, respectively, in the agricultural goods price and the non-agricultural-sector nominal hourly wage during the 1964-78 period. The negative impact on real income is partially offset by the purchasing power gain from the fall in the price of agricultural goods. The equivalent average labor income tax rates of implicit taxation are 18.2% and 21.1%, respectively, for agricultural and non-agricultural sector workers during the 15-year period. These estimates indicate that China's working population was taxed heavily and, farmers, despite their relatively low average income, paid as much as 53.4% of the implicit tax revenue raised during the period.

Appendix: Data Definitions and Sources

1. GDP in 1978 prices (Y), the nominal GDP ($P_0Q + p_I I$), and the GDP deflator: the reconstructed annual national income accounts data prepared by a group of economists at the Chinese Academy of Social Sciences (CASS) (see note 9).
2. Output of agricultural goods in 1978 prices (Q): reconstructed primary industry real GDP series. The NMP index of the agricultural sector (base year, 1952) for the 1963-78 period and the GDP index of the primary industry (base year, 1978) for the 1978-95 period are chained at their 1978 values. This chained 1963-95 index is multiplied by a factor so that its 1978 level matches the nominal primary industry GDP value that year. *Zhongguo tongji nianjian*, 1993 ed., p. 34 and *Zhongguo tongji zhaiyao* 1998, p. 14.
3. Nominal output of agricultural goods (P_0Q): reconstructed primary industry nominal GDP series. The nominal NMP of the agricultural sector for the 1963-78 period and the nominal primary industry GDP for the 1978-95 period are chained at their 1978 values by multiplying the 1963-77 NMP series by 1.0329. The nominal primary industry GDP is 3.29% larger than the nominal agricultural sector NMP in 1978. An implicit assumption here is that this proportion is constant through the 1963-78 period. *Zhongguo tongji nianjian*, 1993 ed., p. 33 and *Zhongguo tongji zhaiyao* 1998, p. 12.
4. Output of non-agricultural goods in 1978 prices (I): obtained by deducting the output of agricultural goods in 1978 prices from the GDP in 1978 prices.
5. Nominal output of non-agricultural goods ($p_I I$): obtained by

deducting the nominal output of agricultural goods from the nominal GDP.

6. *Numbers of rural workers and workers in the primary industry:* *Zhongguo laodong tongji nianjian*, 1995, p. 9 and *Zhongguo tongji nianjian*, 1996 ed., p. 87.
7. *Number of rural workers in non-primary industries:* obtained by deducting the number of workers in the primary industry from the number of rural workers.
8. *Total labor input and the labor input in the agricultural sector (n_0):* hours worked in the primary industry. The CASS data.
9. *Labor input in the non-agricultural sector (n_1):* total hours worked net of hours worked in the primary industry. The CASS data.
10. *Labor Income of rural and urban workers in 1978 prices:* these two series follow national income accounting and therefore contain in-kind income and non-wage benefits. The labor income of rural workers includes the value of agricultural products kept for their own consumption and income from non-agricultural sources. The two series add up to total labor income. The CASS data.
11. *Total labor income in 1978 prices:* sum of the income of rural and urban workers. The CASS data.
12. *Labor income of agricultural workers in 1978 prices:* reconstructed from the CASS data and official Chinese statistics. Per capita earned income and primary industry income of rural population based on sample surveys are available annually since 1978 (*Zhongguo nongye fazhan baogao* 1996, p. 195 and *Zhongguo tongji nianjian*, 1996 ed., p. 301). These data allow one to compute the share of primary industry labor income in earned

income for rural workers each year. The product of labor income of rural workers and this share is the primary industry labor income estimate each year for the 1978-95 period. With this estimate, non-primary industry labor income in rural areas can be computed by deducting primary industry labor income from the total labor income of rural workers. Then, based on the numbers of primary- and non-primary industry workers in rural areas, one can compute the ratio of the mean labor income of non-primary industry workers to that of primary industry workers in 1978. This ratio is calculated as 1.154. Assuming this ratio to be constant during the 1963-78 period, non-primary industry labor income in rural areas is computed each year for the 1963-77 period with the number of rural workers in non-primary industries. Deducting the non-primary industry labor income estimate from the total labor income of rural workers, labor income of agricultural workers can be obtained. This nominal series is converted to the 1978 price series with the GDP deflator.

13. *Labor income of non-agricultural workers in 1978 prices:* obtained by deducting the labor income of agricultural workers in 1978 prices from total labor income in 1978 prices.
14. *Labor income share of value-added in the non-agricultural sector:* obtained by dividing nominal labor income of non-agricultural workers by the nominal output of non-agricultural goods. The GDP deflator is used to convert labor income in 1978 prices to nominal labor income. An assumption here is that the nominal output of non-agricultural goods, or non-agricultural value-added, is the sum of factor incomes (of capital and labor) and

depreciations in the non-agricultural sector. Treating depreciations as part of capital income, one can compute the labor income share with these data. This accounting relationship is correct when indirect taxes net of subsidies are zero. If indirect taxes were larger (smaller) than subsidies, the sum of factor incomes and depreciations would become smaller (larger) than non-agricultural value-added, and the computation method above would understate (overstate) the labor income share. Because the data of indirect taxes and subsidies, particularly the latter, are incomplete, the above assumption is made. Indirect taxes from the non-agricultural sector were important state revenue sources during the pre-reform period. Subsidies, a major part of which were fiscal grants and state bank loans at concessionary terms to finance fixed investment and working capital of state enterprises, were also large then. The CASS economists adopted the same assumption to compute the labor and capital income shares upon performing growth accounting of the Chinese economy (Li et al., 1993).

15. *Agricultural tax in 1978 prices (x)*: budgetary revenue from the agricultural sector (*Zhongguo tongji nianjian*, 1993 ed., p. 217 and 1997 ed., p. 237) is deflated by the GDP deflator.
16. *Price of agricultural goods (P_0)*: this is the GDP deflator for the primary industry (base year, 1978), computed by dividing the nominal output of agricultural goods by the output of agricultural goods in 1978 prices.
17. *Price of non-agricultural goods (P_I)*: this is the GDP deflator for the non-agricultural sectors (base-year, 1978), computed by dividing the nominal output of non-agricultural goods by the

- output of non-agricultural goods in 1978 prices.
18. *Hourly labor income of workers in the agricultural sector (W_0):* labor income of agricultural workers in 1978 prices is divided by the labor input in the agricultural sector.
 19. *Hourly labor income of workers in the non-agricultural sector (W_1):* labor income of non-agricultural workers in 1978 prices is divided by the labor input in the non-agricultural sector.
 20. *Household non-agricultural goods purchase in 1978 prices (γI):* nominal labor income of non-agricultural workers deflated by the price of non-agricultural goods.
 21. *Relative price of non-agricultural goods (PIX):* the price index of non-agricultural goods defined in the bracket of the second term of Equation (3). The two weights reflect the expenditure shares in 1978 (base year).
 22. *Real household disposable income (HDY):* the sum of (i) the nominal labor income of agricultural workers deflated by the price of agricultural goods and (ii) the household non-agricultural goods purchase in 1978 prices.
 23. *Households' expenditure share of agricultural goods in 1978 (θ):* 0.5588. This is the proportion of nominal labor income of agricultural workers to nominal household disposable income in 1978.
 24. *Nominal state fixed investment:* *Zhongguo tongji nianjian*, 1993 ed., p. 149.

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Notes

1. Whether the government should lower the relative price of agricultural goods in terms of industrial goods (known as price scissors) to raise national savings was a central question in the Soviet industrialization debate. Preobrazhensky (translated, 1965) was the main proponent of low relative prices to promote capital accumulation. The Soviet government adopted such a policy during Stalin's rule (Gregory and Stuart, 1990, pp. 84-88 and 94-98).
2. For example, Naughton (1995, pp. 30-33) claims that the Chinese government utilized the "terms of trade between the state enterprise sector and the household sector that are favorable to state enterprises" to "maintain the large state share of national income" (p. 31) during the pre-reform period.
3. In 1978, taxes paid and after-tax profits earned by state industrial enterprises totaled 79.07 billion yuan, or 21.8% of GDP; the state revenue share of GDP was 31.2% and the personal consumption share was 48.8%; and per capita net annual income of rural households was 134 yuan as against 316 yuan in urban households (*Zhongguo tongji nianjian*, 1997 ed., pp. 42, 46-47, 247, 291, and 439). Per capita cash income of rural residents in real terms grew at 2.2% annually between 1957, the year immediately after the collectivization of the agricultural sector, and 1978, on the eve of economic reforms. Per capita cash income of urban residents in real terms also grew slowly (annual 2.3%) during the same period. The annual growth rate of per capita NMP in constant prices was higher, at 3.3%, that period. (*Zhongguo shichang nianjian* 1993, p. 180-81 and *Zhongguo tongji nianjian*, 1993 ed., pp. 34, 81, and 238).

Although personal incomes were not subject to income or payroll taxes through the 1960s and 1970s, a personal income tax was introduced in 1980 under economic reforms. Because the minimum taxable income has been high (800 yuan for monthly wages as in 1993), the personal income tax revenue has been quite modest (19.3 billion yuan or 0.3% of GDP in 1996). In the past few years, the government has been making efforts to institute payroll taxes to finance social insurance programs (*Zhongguo jingji nianjian* 1997, pp. 74 and 436; Zhang et al., pp. 91, 100, and 101; and *Zhongguo tongji nianjian*, 1997 ed., p. 42).

4. For example, in his classical work on the pre-reform Chinese economy (1977, p. 51), Eckstein describes the capital accumulation mechanism thus: "... by manipulating price relations between agricultural and non-agricultural goods in such a way that the farming sector was forced to sell 'cheap' and 'buy dear'. These price manipulations enabled the state trading companies to earn large monopoly profits, which were then paid into the government budget and became a source of financing investment and other government expenditures. At the same time, nationalization of the non-agricultural sectors provided a means through which all net earnings of government enterprises ... became sources of budgetary revenue. In this way institutionalized means were provided to assure a high rate of saving both out of agriculture and out of the non-farm sectors of the economy." Note that Eckstein does not include wage suppression in the non-agricultural sectors as a source of budgetary revenue. Xue Muqiao (1979, p. 155), a well-respected economist close to the Chinese government, acknowledged that farmers contributed to at least one-third of the budgetary revenue (around the time he wrote), mainly

through the exchange of agricultural products for industrial products at unfavorable terms. Such contributions showed up in high profits and tax payments in the industrial sector.

5. One of the exceptions was Naughton (see note 2). As the large urban-rural income gap (see note 3) indicates, urban workers in the state sector used to be regarded as a privileged class. One of the most important factors behind relatively high urban income has been strict (rural to urban) migration control enforced by the government. Had it been not for such migration control, urban migration of rural underemployed would have driven down urban wages and benefits and narrowed the urban-rural income gap during the pre-reform period. The idea that urban wages were suppressed to finance the state budget may therefore have looked counterintuitive to students of the Chinese economy.

6. Ishikawa and Nakagane found that, in terms of current prices, the agricultural sector was a net recipient of resources from the non-agricultural sector in most years during the 1960s and 1970s. The estimated net resource inflows were small relative to agricultural incomes, however. Sheng, with his estimates of theoretical prices, found downward distortions in the state purchase prices of agricultural products. He claims that, because price distortions were large, there were net resource flows of substantial size from the non-agricultural to the agricultural sector during the pre-reform period. Sheng (1993b, pp. 103-07) also introduces the Chinese literature, which uses the labor theory of value and generally indicates net resource outflows from the agricultural sector.

7. Sah and Stiglitz (1984 and 86) demonstrate with a two-sector (urban and rural) general equilibrium model that Preobrazhensky's proposition

("... the state can increase accumulation by moving the terms of trade against peasants, that is, by increasing the size of scissors." 1965, p. 127) holds in a general case for a socialist economy, which is constrained by external trade and borrowing. Knight (1995) confirms this proposition with offer curve analysis from trade theory. According to the Sah-Stiglitz model, moving the terms of trade against the rural sector (for example, lowering the rural goods price while holding the urban goods price constant) shifts household demand away from urban goods in favor of rural goods. In order to maintain the equilibrium in the consumption goods markets, the government must reduce urban wages and therefore urban wage payments. Consequently, the proportion of urban goods output kept by the government, which represents the state's investable resources, rises. Government policy to lower the relative price of rural goods here also leaves the urban population worse off. Blomqvist (1986) and Carter (1986) consider a few special cases of the Sah and Stiglitz model when the government sets different prices for agricultural goods in two sectors (Blomqvist) and when the economy is not trade-constrained and the wage level affects workers productivity substantially (Carter).

8. State fixed investment, the bulk of which went to infrastructure and the industrial sector, accounted for 15.8% of GDP in the 1964-78 period (Table 2). Industrial output grew 12.1% annually during the period and its nominal NMP share rose from 33.7% in 1963 to 49.4% in 1978 (NMP accounts, *Zhongguo tongji nianjian*, 1993 ed., pp. 33-34).

China's economic institutions during the 1964-78 period closely resemble those under classical socialism. Government economic plans, most important of which was the annual plan, began to play the central role in resource allocation towards the end of the First Five-Year

Plan period (1953-57). The industrial and commercial enterprises were either state-owned or collectively-owned since 1956 (Xu, 1982, pp. 7 and 8). The two types of enterprises did not differ in substance; both were subject to strict government control. The collectivization of the agricultural sector was completed by around 1956 (Xu, p. 7).

The government introduced a uniform wage system with standard eight ranks for urban workers in 1956 (Eckstein, 1977, p. 150). The prices of virtually all merchandise marketed through state-controlled wholesale and retail outlets were placed under government regulation by the second half of the 1950s (Eckstein, 1977, p. 292; and Perkins, 1966, pp. 178-96). In 1978, goods sold at state-fixed prices accounted for 97.0% of retail sales and 94.4% of agricultural products sold by farmers (Luo, 1991). Government corporations conducted foreign trade, and the economy did not depend much on foreign trade during the 1960s and 1970s. The ratio of exports to GDP in 1964 and 1978 were, respectively, 4.1 and 4.6% (*Zhongguo tongji nianjian*, 1993 ed., p. 633 and the CASS data). Nevertheless, all of these institutional features had changed dramatically under economic reforms by the end of the 1980s.

9. These economists with the Institute of Quantitative and Technical Economics at the Chinese Academy of Social Sciences (CASS) have prepared the data to perform growth accounting. The detailed results of the growth accounting exercise and part of the data used have been published (Li et al., 1993).

10. Despite rapid industrialization, China remained a predominantly agricultural economy during the pre-reform period. The agricultural sector's shares in GDP and employment were, respectively, 41.6 and 82.2% in 1964 and 28.1 and 70.7% in 1978 (Table 2 and *Zhongguo laodong*

tongji nianjian 1995, p. 9).

11. Note that the relative price of rural goods may have to rise if the income elasticity of urban goods is very high (or of rural goods very low). The elasticity estimate below shows that the income elasticity of urban goods in China is small enough for the statement in the text to be valid.

12. This and following paragraphs are adapted from Knight's text that accompanies Figure 1 in his article (1995, pp. 117-19).

13. Agricultural output that corresponds to the agricultural tax and non-agricultural output that would be claimed by the government as proprietor's income, in the absence of the implicit labor income taxation, are omitted in the figure. These represent the government's primary revenue source and are set aside for its own use.

14. See Wiemer and Lu (1993) and Hu and Li (1995), respectively, for detailed chronological reviews of price and wage decontrol under economic reform.

15. *Zhongguo tongji nianjian*, 1993 ed., pp. 215 and 430; and 1997 ed. p. 42.

16. In the Appendix, see the terms, "labor income of agricultural workers in 1978 prices" and "labor income of non-agricultural workers in 1978 prices", for the details.

17. In the Appendix, see the term, the "labor income share of value-added in the non-agricultural sector", for the computation method.

18. Because only labor income is considered in this model, the assumption here is that all labor income is spent on two goods. This may be a good approximation. Household savings in financial assets represent the income not spent. These savings, which took the form of

accumulating savings deposits and currency stock, were relatively low during the pre-reform period. The sum of the annual increments of savings deposits and currency held by households can be regarded as annual household savings in financial assets. Deducting the interest income of savings deposits from this sum, one obtains approximate household savings in financial assets from labor income. (Interest income is computed as the product of savings deposits at the end of the previous year and the one-year savings deposit interest rate.) The proportion of household savings in financial assets from labor income to nominal labor income represents the average household financial saving rate from labor income. The mean of the average household financial saving rate during the 1964-78 period computed was as low as 1.2%. (*Zhongguo shichang tongji nianjian* 1993, p. 182, *Zhongguo jinrong nianjian* 1993, p. 38, and the CASS data).

19. A single agricultural goods price applies to both agricultural and non-agricultural workers in the Sah-Stiglitz model (1984). Blomqvist (1986) modified the model by introducing two separate prices: a low purchase price (for agricultural workers) and a high retail price (for non-agricultural workers). Because I cannot find strong evidence to suggest that the Chinese government deliberately kept wide the retail-purchase price gap of agricultural goods, this paper's model adopts a single price.

Perkins (1966, p. 111) computed tax and profits as the percentage of the average cost of various commodities around 1957: the mean of all commodities (50%), grain (15-20%), sugar (40%), and cigarettes (160-335%). If the retail-purchase price difference of agricultural goods had been wide, the percentage must have been high for agricultural commodities. Considering that grain's retail value weight

was high relative to sugar and cigarettes, the three commodities' percentage rates taken together do not appear to be far away from the mean. On the contrary, if retail prices had been kept low relative to purchase prices for agricultural commodities, the state marketing sector would have required subsidies to cover deficits. The government does not appear to have spent much on subsidies, either. For example, only 1.1 billion yuan was spent on subsidies to support grain and edible oils marketing in 1978 (*Zhongguo tongji nianjian*, 1993 ed., p. 231).

20. A number of necessities and consumer durables (such as grain, pork, edible oils, cotton cloth, coal, bicycles, and radios) were subject to rationing, particularly in urban areas, during the period under investigation (Perkins, 1966, pp. 183-192). Because this study relies on two highly aggregated prices (agricultural and non-agricultural) represented by GDP deflators, market disequilibria in individual commodities are not considered. The GDP deflators are consistent with the product and factor cost accounts owing to national income identities. It is theoretically possible, however, that the disequilibria at the microeconomic level affect the relative price between the two aggregate goods. Available information does not allow one to assess this kind of bias, nonetheless.

21. The Table below shows the structure of the model.

Equation Number	Endogenous variables								
	Q	I	P_o	W_o	G	W_I	K_I	Y	
(1)	x								I
(2)		x							I
(3)	o	o	x						II
(4)	o		o	x					III
(6)		o	o		x				III
(5)		o				x			IV

(7)		o		x		IV
(8)	o	o			x	IV

x and o denote, respectively, endogenous variables that are associated with the equations and other endogenous variables that appear in the equations. Roman numerals in the last column indicate the order of iteration.

22. The Dickey-Fuller t -statistic of the Engle-Granger cointegration test with the natural logarithms of the three variables and a constant for the 1964-92 period is -4.185, which are between the five (-4.071) and one percent (-4.872) levels of the MacKinnon critical values.

23. Equation (3) has been estimated for the 15 years under investigation (1964-78) to evaluate how the choice of coefficient estimates would affect the implicit labor income tax rates computed. Note that, although the three variables are $I(1)$, Equation (3) fails the Engle-Granger cointegration test if the sample period is restricted to the 1964-78 period.

$$\ln \gamma I = -1.405 - 1.121 \ln PIX + 1.106 \ln HDY,$$

$$(-3.308) \quad (-4.143) \quad (12.680)$$

$$\text{Adjusted } R^2 = 0.992 \quad D.W. = 1.369 \quad \text{Period} = 1964-78.$$

The price and income elasticity estimates are not very different from those with the 1964-92 period. These estimates based on the 1964-78 samples would change the agricultural goods price and the implicit labor income tax rates computed. Although the tax burden would shift somewhat from agricultural to non-agricultural workers, the differences would be generally small. The alternative results would not fundamentally alter this paper's conclusion. With the coefficient estimates based on the 1964-78 samples, the values for the 1964-78

period reported on the bottom row of Table 5 would be:

(i) Agricultural, nominal wage change from the terms of trade deterioration: -29.8% (Table 5, -33.1%).

(ii) Non-agricultural, nominal wage change: -36.7% (-36.7%).

(iii) Common, real income gains from low agricultural goods prices: 20.1% (22.8%).

(iv) Implicit labor income tax rates: agricultural 16.1% (18.2%); non-agricultural, 22.8% (21.1%); mean, 19.4% (19.9%).

(vii) Tax payment shares: agricultural, 47.4% (53.4%); non-agricultural, 52.6% (46.6%).

24. To compute real hourly wages (fifth and eighth columns) after the rise of the agricultural goods price, nominal hourly wages (fourth and seventh columns) are deflated by the price index with fixed 1978 weights, $\theta P_0 + (1 - \theta)P_t$, where P_0 rises. θ represents households' expenditure share of agricultural goods in 1978 (See the Appendix).

25. The following procedure is used to compute the mean tax rate.

First, implicit labor income tax revenues from agricultural and non-agricultural sector workers are computed separately as observed labor income $\cdot [(1 - 0.01 \cdot \text{percentage tax rate})^{-1} - 1]$. The sum of the observed labor income and the tax revenue represents (notional) total labor income for each sector. Then the mean tax rate is computed as the proportion of the sum of two sectoral tax revenues to the sum of two sectoral total labor incomes. By extension, the tax payment shares of the two sectors (Table 5, seventh and eighth columns) can be obtained with these data.

26. With the official exchange rate, per capita net income of rural and urban households in 1978 were 79.4 and 187.7 U.S. dollars, respectively (*Zhongguo tongji nianjian*, 1997 ed., p. 291 and the

International Monetary Fund, 1997, p. 296). For the U.S. case, one can compute the tax burden as a proportion of personal income with national income accounts data. Let us consider the sum of personal income and employer contributions to social insurance as a broadly defined personal income in the U.S. The proportion of the sum of personal tax and nontax payments and (employers' and personal) contributions to social insurance to this broadly defined personal income was 22.7% in 1996 (U.S. Bureau of the Census, 1997, pp. 453 and 455). In order to finance relatively generous benefits, social insurance contributions are high in the U.S., however. Excluding social insurance contributions, the proportion of personal tax and nontax payments to personal income was 13.4% that year. In pre-reform China, only urban workers, which accounted for less than a quarter of total employment, were eligible for pension, medical, housing, and other benefits directly or indirectly provided by the state. The implicit labor income tax rates computed do not appear to be low, particularly for farmers, in comparison with the personal tax burden in the U.S.

27. See Lin (1990) and Riskin (1987, pp. 92-95) for the incentive problems in China's collective farms.

TABLE 1

Non-Agricultural Sector: Labor Income Share of Value-added			
Year	Pre-reform period	Year	Reform Period
	%		%
1964	34.0	1979	29.0
1965	30.3	1980	31.3
1966	26.8	1981	34.3
1967	31.4	1982	36.7
1968	35.1	1983	38.1
1969	28.7	1984	41.6
1970	23.9	1985	39.0
1971	23.1	1986	42.4
1972	24.8	1987	43.7
1973	24.2	1988	45.0
1974	25.0	1989	45.2
1975	24.2	1990	42.3
1976	26.9	1991	39.8
1977	26.6	1992	40.2
1978	26.5	1993	39.2
		1994	41.9
		1995	41.7
			(Pre-reform)
			1964-69
			31.0
			1970-78
			25.0
			1964-78
			27.4
			(Reform)
			1988-95
			41.9

TABLE 2
Implicit Tax Revenue

Year	Non-agricultural				Implicit Labor Income Tax			State
	GDP (A)	Value-added (B)	Labor Income		Tax Revenue (C)	Non-agricultural		Invest- ment GDP Share
			Observed	Zero Tax		Value-added Share (C/B)	GDP Share (C/A)	
				Revenue Case				
			billion 1978 yuan			%	%	%
1964	132.4	77.3	26.3	32.5	6.2	8.0	4.7	12.2
1965	154.8	91.6	27.7	38.4	10.7	11.7	6.9	13.4
1966	181.1	111.3	29.8	46.6	16.8	15.1	9.3	13.7
1967	168.0	97.8	30.8	41.1	10.3	10.5	6.1	10.8
1968	157.0	87.0	30.6	36.5	5.9	6.8	3.8	9.2
1969	187.4	114.3	32.7	47.9	15.2	13.3	8.1	12.9
1970	231.0	148.5	35.5	62.2	26.7	18.0	11.6	16.3
1971	252.1	167.1	38.6	70.1	31.5	18.9	12.5	16.9
1972	259.2	174.3	43.2	73.0	29.8	17.1	11.5	16.2
1973	280.8	187.8	45.4	78.8	33.4	17.8	11.9	15.9
1974	284.0	187.4	46.9	78.6	31.7	16.9	11.2	16.5
1975	307.6	206.9	50.1	86.8	36.7	17.7	11.9	18.3
1976	299.5	199.0	53.5	83.4	29.9	15.0	10.0	18.1
1977	322.8	226.2	60.1	94.9	34.8	15.4	10.8	17.4
1978	362.4	260.6	69.1	109.2	40.1	15.4	11.1	18.5
1964-69	163.5	96.6	29.7	40.5	10.8	11.2	6.6	12.1
1970-78	288.8	195.3	49.2	81.9	32.7	16.7	11.3	17.2
1964-78	238.7	155.8	41.3	65.3	24.0	15.4	10.1	15.8

Note.- The last column is computed with two nominal series for the ease of comparison with the seventh column. By comparing these two columns, one can assess the extent to which the implicit labor income tax financed state fixed investment each year.

TABLE 3

Price Scissors

Year	Household Non-agricul- tural Goods Purchase		GDP Deflators			Terms of Trade		
			Agricultural		Non-agri- cultural	Zero Tax		Rate of
	Observed	Revenue Case	Observed	Zero Tax Rev- enue Case (B)	Observed	Observed	Revenue Case	Deterio- ration
	Billion 1978 yuan		(A) 1978=100		(C) 1978=100	(A)/(C) 1978=100	(B)/(C)	[(A/B)]-1 %
1964	21.0	25.9	80.2	108.3	129.1	62.1	83.8	-25.9
1965	23.3	32.3	85.3	128.0	124.4	68.5	102.9	-33.4
1966	26.2	41.0	85.8	142.3	116.5	73.6	122.1	-39.7
1967	26.2	34.9	85.6	122.6	121.7	70.4	100.8	-30.1
1968	25.9	31.0	88.7	111.3	124.1	71.5	89.7	-20.3
1969	29.8	43.6	89.3	132.7	112.0	79.7	118.4	-32.7
1970	34.1	59.8	91.0	148.5	101.5	89.6	146.3	-38.7
1971	37.5	68.1	93.0	155.7	101.1	92.0	154.0	-40.2
1972	42.3	71.5	94.0	144.2	100.4	93.6	143.6	-34.8
1973	44.5	77.2	94.6	149.9	100.4	94.2	149.3	-36.9
1974	45.9	76.9	94.7	147.9	100.7	94.0	146.8	-36.0
1975	49.6	86.0	95.3	150.7	97.8	97.4	154.0	-36.7
1976	53.5	83.4	96.6	139.6	96.7	99.9	144.5	-30.8
1977	59.7	94.3	96.2	138.7	98.3	97.9	141.1	-30.6
1978	69.1	109.2	100.0	140.5	100.0	100.0	140.5	-28.8

Note.- The observed non-agricultural labor income (Table 2) and the observed household non-agricultural goods purchase above are identical in nominal terms. The differences between the two series listed come from the two separate deflators (the GDP deflator for labor income and the GDP deflator for non-agricultural sectors for household purchase) used to compute the constant price series.

TABLE 4

Wage Reductions

Year	Hours Worked		Hourly Wage: Agricultural			Hourly Wage: Non-agricultural		
	Agri-cultural	Non-agri-cultural	Observed	Zero Tax Revenue Case		Observed	Zero Tax Revenue Case	
				Nominal	Real		Nominal	Real
Billion man-hours		1978 yuan						
1964	393.7	106.6	0.098	0.133	0.114	0.246	0.304	0.260
1965	406.8	112.4	0.103	0.154	0.125	0.246	0.342	0.278
1966	420.3	118.2	0.113	0.187	0.145	0.252	0.395	0.307
1967	436.4	121.6	0.107	0.153	0.128	0.253	0.337	0.281
1968	452.5	124.7	0.099	0.125	0.111	0.245	0.293	0.260
1969	470.3	128.9	0.101	0.150	0.122	0.254	0.372	0.304
1970	486.4	136.5	0.109	0.177	0.139	0.260	0.456	0.358
1971	498.2	148.1	0.121	0.202	0.157	0.260	0.473	0.367
1972	502.9	158.0	0.119	0.182	0.147	0.274	0.463	0.373
1973	507.4	163.7	0.133	0.210	0.167	0.277	0.481	0.382
1974	516.3	169.2	0.138	0.216	0.172	0.277	0.464	0.371
1975	522.3	178.5	0.149	0.236	0.187	0.281	0.486	0.386
1976	526.4	189.7	0.151	0.219	0.181	0.282	0.440	0.364
1977	529.0	199.8	0.156	0.224	0.186	0.301	0.475	0.394
1978	533.4	209.0	0.164	0.231	0.194	0.331	0.523	0.439

TABLE 5

Implicit Labor Income Tax Rates

Implicit Labor Income Tax Rates								
	Agricultural	Non-agri- cultural	Common	Implicit Labor Income Tax Rates			Tax Payment Shares	
	Nominal Wage Change from the Terms of Trade Dete- rioration	Nominal Wage Change	Real Income Gains from Low Agri- cultural Goods Prices	Agri- cultural	Non-agri- cultural	Mean	Agri- cultural	Non-agri- cultural
Year								
				%				
1964	-25.9	-19.0	16.9	13.4	5.2	10.3	80.5	19.5
1965	-33.4	-27.8	22.9	18.1	11.3	15.5	72.4	27.6
1966	-39.7	-36.1	28.5	22.5	17.8	20.8	68.0	32.0
1967	-30.1	-25.0	20.2	16.0	9.9	13.7	72.5	27.5
1968	-20.3	-16.2	12.8	10.1	5.5	8.3	73.8	26.2
1969	-32.7	-31.6	22.4	17.7	16.4	17.2	61.3	38.7
1970	-38.7	-42.9	27.6	21.8	27.2	24.1	52.6	47.4
1971	-40.2	-45.0	29.0	22.9	29.0	25.4	53.2	46.8
1972	-34.8	-40.8	24.1	19.1	26.5	22.4	47.4	52.6
1973	-36.9	-42.4	26.0	20.5	27.4	23.4	50.4	49.6
1974	-36.0	-40.4	25.2	19.9	25.4	22.1	52.6	47.4
1975	-36.7	-42.3	25.8	20.4	27.4	23.3	51.4	48.6
1976	-30.8	-35.9	20.8	16.4	22.5	19.0	50.2	49.8
1977	-30.6	-36.7	20.6	16.3	23.6	19.5	46.3	53.7
1978	-28.8	-36.7	19.2	15.2	24.6	19.6	41.0	59.0
1964-69	-30.4	-26.8	20.6	16.6	11.3	14.6	69.8	30.2
1970-78	-34.9	-40.0	24.3	19.0	25.9	21.8	49.3	50.7
1964-78	-33.1	-36.7	22.8	18.2	21.1	19.9	53.4	46.6

FIGURE 1

Price-Wage Manipulation and Households

Source.- Knight (1995), Figure 1. The Preobrazhensky case, p. 118. A few modifications are made.

FIGURE 2
Labor Income Share of Non-agricultural Value-added

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