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by

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Redistributive Impacts of Personal Income Tax in Urban China*

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I. Introduction

Taxation is major source of fiscal revenue and has a strong effect on income distribution. Taxation can either reduce inequality or make inequality worse, depending on the type and rate of taxation. Generally, a personal income tax will improve inequality, whereas a general sales tax will exacerbate inequality. This is because with the former there is a statutory rate that increases with income, and with the latter tax is collected from everyone based on consumption rather than on earnings. Therefore, a tax system that relies heavily on a general sales tax as opposed to a personal income tax has an adverse impact on income distribution. This is precisely the case in China.

A tax is progressive if tax liability relative to income rises as income increases. Typically, the statutory rate of the personal income tax increases with income, thus it is progressive. In fact, it is usually the most progressive element in the tax system. Given that the personal income tax is progressive, the extent to which it contributes to reducing inequality depends on its rate, or the proportion of the personal income tax to the total income. As will be seen later in this chapter, the contribution of the personal income tax to reduce inequality mainly depends on two components, its progressivity and the average tax rate. Additional contributions can be derived by raising the average rate of the personal income tax while holding the progressivity constant, or vice versa. It is clear that the personal income tax in China is progressive because there is a very high statutory marginal rate.[1] The extent of the contribution of the personal income tax to inequality therefore relies on the average proportion of the tax in the total income.

In this chapter we use the China Household Income Project (CHIP) urban survey data for 2007 to analyze the impact of the personal income tax on income distribution in urban China. The CHIP urban dataset contains information on income and taxes at the individual or household level, so in principle it should not be difficult to gauge the contribution of the personal income tax to income distribution. Some difficulty arises, however, due to the quality of the information that is reported by the households on the amount of personal income tax paid by the individual members of the household. On close inspection, we find that the dataset substantially understates the amount of income taxes paid, probably due to underreporting or/and non-reporting. This bias, if not corrected, will lead to an underestimation of the contribution of the personal income tax to inequality. Thus, although the main task in this study is to evaluate the redistributive effect of the personal income tax, a second and necessary task is to address the bias in the reported tax data.

The remainder of this chapter proceeds as follows. The next section, Section II, introduces the personal income tax in the context of the broader Chinese taxation system. In Section III we describe our methodology for measuring the redistributive effect of the personal income tax; we demonstrate the understatement of the paid taxes in our dataset; and we explain how we address this understatement by applying the personal income tax schedule to derive the hypothetical tax that a taxpayer would pay based on his income. This is followed in Section IV by a discussion of estimates of the redistributive effects of the personal income tax. These estimates are calculated using the hypothetical tax levels that we have imputed, which are equal to the amount of taxes implied by the official tax schedule. Section V presents our conclusions.

II. The Personal Income Tax in the Chinese Taxation System

601

The current Chinese tax system was established as part of the 1994 fiscal reform, which is also called the tax-sharing reform. The most notable feature of this fiscal reform is the dominance of indirect taxes as a share of the collected tax revenue. Table 10.1 presents the composition of the tax revenue by major taxes in selected years after the 1994 fiscal reform. The value-added tax (VAT) accounts for the largest share of the total tax revenue. This share was as high as 44.4 percent in the year after the 1994 fiscal reform but thereafter it declined; however, in more recent years it still accounted for nearly one-third of total tax revenue. The VAT is levied on the value-added generated from all activities taking place in primary and secondary industries. Wholesale and retail and repairs and replacements in the tertiary sector are also subject to the VAT.

The business tax is complementary to the VAT in terms of its sectoral coverage. All activities carried out in tertiary industries, with the exception of the subsectors subject to the VAT mentioned above and government services, are subject to the business tax. The business tax is levied on the total sales of tax-paying units and therefore it is a turnover tax. This type of tax is known to have a cascade effect, which is the main reason for implementation of the VAT. The business tax, as can be seen in Table 10.1, is the third largest tax in terms of share of tax revenue, accounting for a constant proportion of more than 13 percent of the total tax revenue.

The consumption tax is a type of excise tax charged on selected goods such as tobacco, alcohol, jewelry, motorcycles, motor vehicles, and so on.[2] Customs duties, which consist of value-added and consumption taxes levied on imported goods, as opposed to goods produced domestically, has provided about 12 percent of the total tax revenue since 2000.

<Table 10.1 about here>

The above taxes are the four major indirect taxes in China. Together, in 1995 they accounted for about 75 percent of the total tax revenue. Although this proportion has been declining, in 2007 it still exceeded 60 percent. Excluding customs duties, the three other major indirect taxes charged on domestic goods and services accounted for more than 68 percent in 1995 and close to 50 percent (49.3 percent) in 2007 of the total tax revenue.

Clearly, then, since the 1994 fiscal reform Chinese taxation has been mainly dependent on indirect taxes. This feature has important implications for income distribution. Unlike direct taxes such as a personal income tax, indirect taxes are charged on expenditures. Because the poor tend to spend a larger proportion of their income than the rich, paid indirect taxes as a proportion of income tend to decline with household income, a well-known regressive feature of an indirect tax. Fukao et al. (2010) calculate the traditional tax incidence for China and conclude that, as a whole, the tax system is regressive and has adverse effects on inequality. This occurs despite the fact that the personal income tax together with the corporate income tax, which are progressive under certain assumptions, offset some of the adverse redistributive effects of the indirect taxes, but not sufficiently to counter all of their adverse effects.

As in most countries, China has two types of income tax; one is a corporate income tax and the other is a personal income tax (PIT). As can be seen in Table 10.1, the corporate income tax shows an upward trend in proportion to total tax revenue, accounting for close to 20 percent in recent years.[3] In the literature on the incidence of taxation, the implications of the corporate income tax on income distribution remain uncertain, because it is difficult to predict who ultimately bears the costs of corporate taxes. The corporate tax can be shifted to consumers who buy goods and services produced by enterprises that are subject to the corporate tax. It can also

be shifted to workers, if the owners of enterprises that are subject to the tax lower wages to reduce their corporate tax liability. After such shifts in the tax burden, the remaining liability rests with the owners of the enterprises that are subject to the tax. To the extent that some of the corporate tax is shifted to consumers and/or workers, the corporate tax becomes less progressive than otherwise.

Unlike the taxes discussed above, in general the personal income tax is progressive. Except for limited groups of special-skilled persons who are able to bargain over their after-tax pay, and for workers who are members of strong labor unions, the personal income tax is borne by the person subject to the tax. Such is the case in China, where labor unions are not strong. Because the statutory rate of the personal income tax is typically higher for taxpayers with higher incomes, the average rate of the tax will rise with the income of the taxpayers. This is the case in China, as will be illustrated below.

The current personal income tax in China is administered on the basis of itemized income. More specifically, income subject to the PIT is split into different categories, each of which has a different exemption, deduction, tax rate, and so on. The personal tax liability is the sum of the taxes paid in the different categories of taxable income. Table 10A.1 in the Appendix to this chapter summarizes the main elements in the personal income tax in 2007.

III. Methodology and Data Issues

The purpose of this study is to measure how and to what extent the personal income tax affects inequality in urban China. The most frequently used measure of the redistributive effects of taxes is an index proposed by Musgrave and Thin (1948), called the MT index.

The MT index is defined as the difference between the Gini coefficients of before-tax and after-tax income, which is expressed by the following formula:

$$MT = G - G^*$$ (1)

where MT stands for the MT index. G and G^* represent the Gini coefficients for before- and after-tax income, respectively. If the tax helps to reduce inequality, then after-tax inequality as measured by the after-tax Gini coefficient should be lower than before-tax inequality, and the MT index should have a positive value. Conversely, if the tax has dis-equalizing effects, then the MT index will take a negative value. The sign and size of the MT index is used as an indicator of how and to what degree taxes influence the income distribution.

The progressivity of a tax is another important indicator used to assess redistributive effects. A tax is proportional if its rate remains constant with income, and it is progressive (regressive) if the rate goes up (or down) with income. The most common measure of progressivity, called a P index, was proposed by Kakwani (1977). A P index is defined as the concentration ratio of the tax minus the Gini coefficient of before-tax income. That is:

$$P = C - G$$ (2)

where P denotes the P index of the tax and C denotes the concentration ratio of the tax. The concentration ratio of a tax is an indicator of the distribution of the tax liability among the population in association with income.[4] If the concentration of a tax equals the Gini coefficient of the before-tax income (that is, the P index takes a value of 0), it means that the tax has the same distribution

605

among the population as that of income in the sense that the proportion of tax liability to income is constant for any individual in the

population, or that each individual's share of the total tax liability equals that individual's share of the total income. This implies that

the tax is proportional. If the concentration ratio of the tax is larger than the Gini coefficient of before-tax income (that is, the P index

takes a positive value), then the tax share is higher than the income share for individuals with higher incomes and lower for

individuals with lower incomes.[5] Thus, it is a progressive tax. A regressive tax can be defined similarly.

Kakwani (1984) makes a distinction between the measure of the redistributive effects of the tax and the measure of the

progressivity of the tax by decomposing the MT index into two components as follows:

$$MT = (C_d - G^*) + \frac{tP}{1-t} \qquad\qquad (3)$$

where C_d stands for the concentration ratio of after-tax income,[6] and t is the average rate of the tax. An explanation of the two terms

on the right-hand side of equation (3) is linked to the principle of two types of tax equity: horizontal equity and vertical equity. In fact,

the two terms measure the effects of the two types of tax equity on income distribution. The principle of horizontal tax equity requires

that equals should be treated equally. The equals are defined in terms of ability to pay (the tax); observed income is commonly used as

a measurable indicator of the ability to pay. In other words, the principle of horizontal tax equity requires that individuals with

identical incomes should pay the same amount of tax. Whether, and to what extent, the principle of horizontal tax equity is violated is

examined empirically by comparing the rankings of individuals in a post-tax distribution of income to their rankings in a pre-tax

distribution of income. Rosen (1978), following a suggestion by Feldstein (1976), uses the rank correlation coefficients between the

pre- and post-tax ordering of the estimated utilities to measure departures from horizontal equity. The measure, as pointed out by

Kakwani (1984), has no clear link to any indicator of inequality, thus the effect of horizontal inequity on the distribution of income

cannot be measured. Atkinson (1980) employs the concentration ratio and Gini coefficient of after-tax income to examine the effect on

equality of a change in the ranking of an individual by taxation, but does not propose any summary indicator. Plotnick (1981) uses a

similar measure as the first term on the left-hand side of equation (3) above to measure the horizontal inequity, but he does not link the

measure to indices of inequality.

Horizontal equity, examined by a re-ranking of individuals based on after-tax income, requires that the after-tax income should

not change the before-tax ranking of individuals. If horizontal equity is violated, the redistributive effects of taxation on inequality are

affected. In other words, given the progressivity of the taxation, a reduction in the Gini coefficient of after-tax income would be

moderate if there were a change in the pre- and post-tax income rankings of individuals. The first term on the right-hand side of

equation (3) captures this point. Where C_d is the concentration ratio of the after-tax income, with the ranking by the before-tax

income, G^* is the Gini coefficient of the after-tax income, with the ranking of the after-tax income. C_d equals G^* if the rankings of

the pre-tax and post-tax income are identical. Otherwise, as demonstrated Kakwani (1980), Atkinson (1980), and Plotnick (1981), the

former is smaller than the latter. This means that $C_d - G^*$, the first term on the right-hand side of the equation, takes a maximum value

of 0 when the tax does not change the ranking of individuals, and takes a negative value whenever there is a change in ranking from

the pre-tax to the post-tax income. It is clear that, given the progressivity of the taxation (the second term on the right-hand side of

equation [3]), the redistributive effect of taxation on inequality is reduced (the MT index will take a small value) when there is a change in the ranking from the pre-tax and post-tax income (that is, $C_d - G^*$ takes negative values).

The second term on the right-hand side of equation (3) measures the contribution of the progressivity of the tax to inequality. This term is related to the principle of vertical tax equity, which means that people with different incomes are taxed differently. P is a widely used indicator proposed by Kakwani to measure the tax progressivity. As discussed above, P takes a value of 0 if the tax rate is constant among people with different incomes; it takes a negative value if the tax rate decreases with income, and it takes a positive value if the tax rate increases with income. A progressive tax, that is, a tax whose rate increases with income, will contribute to a reduction in inequality, but inequality will remain unchanged if the tax is proportional, and inequality may become worse if the tax is regressive. Note that, with $C_d - G^*$ given, the extent to which the tax contributes to inequality depends on not only how progressive the tax is (captured by P in the second term on the right-hand side of equation [3]), but also on how high the tax rate is, which is measured by $t/(1+t)$ in the term. It is clear that given the progressivity of the tax, a higher tax rate will result in a higher contribution of tax to inequality.

Like other chapters in this book, the data used in this study come from the 2007 CHIP. We limit our analysis to the CHIP urban sample because the current PIT in China is limited to residents in urban areas. The migrant sample is not included in this study due to data availability.[7] Thus, our sample of 10,000 households only includes urban residents.

In addition to information on the total income of individuals and the major components of their income, the CHIP urban dataset also contains information on taxes paid by individuals. Whereas the personal income tax is administered on the basis of itemized income, which means taxpayers pay their income tax by the category of the income they earn, taxes in the dataset are not listed separately according to the income components. Only the aggregate amount of the income tax is provided. On inspection, based on two checks of the data we find that the available information on taxes in the dataset understates the taxes paid by individuals. First, we compare the average PIT rate found in our dataset with that derived from tax data published by the State Administration of Taxation (SAT), the government agency responsible for collecting the PIT and other taxes, which publishes annual total tax revenue and revenue by tax, including revenue from the PIT. Information on the total PIT collected each year published by the SAT can be considered to be accurate.[8] We combine this tax information with the total gross income of urban households published by the National Bureau of Statistics (NBS) based on the NBS household survey,[9] to provide an estimate of the average rate of the PIT for urban households as a whole. The resulting tax rates, as shown in Table 10.2, are 2.95 percent in 2002 and 3.60 percent in 2007. If the available information on taxes in the CHIP urban dataset is accurate and free of underreporting or non-reporting, it should yield an average PIT rate close to the average rate obtained above, on the assumption that our urban sample is representative of all urban households in terms of income. The average rate of the PIT based on our dataset, however, is much lower than that calculated from the SAT and NBS data: 0.33 percent in 2002 and 0.85 percent in 2007,[10] far below the rates reported in Table 10.2.

<Table 10.2 about here>

Our second check is to look at the information on income and taxes in our dataset to see whether or not all individuals with positive taxable income report taxes.[11] We limit this check to the two major income components subject to the PIT. One is wages and salary, and the other is business operating income. Under the current Chinese personal income tax law, any person who earned wages and salary of more than 800 yuan in any month of 2002 (1,600 yuan in 2007), which were the allowable deductions in those two years, must pay an income tax. Of 5,137 individuals whose average monthly income was above 800 yuan in 2002, 64.6 percent, or 3,319 individuals, reported no tax. This is a fairly large portion. The non-reporting of tax might be more likely for individuals with low wages than for individuals with high wages, probably due to the fact that the small amount of tax owed by the former is easier to overlook than the large amount owed by the latter. In order to determine whether this is the case, we look at the proportion of individuals failing to report any tax by quintiles of taxable wages. The results are summarized in Table 10.3 for 2002 and 2007. The table confirms our point. In 2002, the proportion of individuals with positive taxable income who did not report paying taxes dropped significantly by quintile of the income distribution, from 84.7 percent in the lowest quintile to 46.2 percent in the highest quintile.

The picture does not change for 2007, with the exception that the proportion of individuals reporting no tax decreased both for the entire sample and for each quintile, reflecting an improvement in the administration of the personal income tax.

<Table 10.3 about here>

610

The non-reporting of tax also occurs among individuals who earn business operating income. Under the personal income tax law, any person must pay the PIT on her/his positive net operational income. Table 10.4 presents information on the non-reporting of tax by quintile of net operating business income. As can be seen in the table, 715 individuals in our dataset in 2002 earned a positive net operating income, of which only 5.0 percent reported a positive tax for this category of income. In 2007, the proportion was higher at 9.39 percent, another sign of an improvement in the administration of taxation. The portion reporting no tax among earners of business operating income is much lower than that of wage earners. The proportion of individuals who report no tax on net operating income is lower in the lower and higher quintiles and higher in the middle quintiles in both 2002 and 2007.

<Table 10.4 about here>

In view of the very large discrepancy between average tax rates implied by the SAT and NBS data and that found in the CHIP urban datasets, and also in view of the high incidence of no reported tax payments in the CHIP urban datasets, we conclude that the tax information in our data is understated and inadequate for an assessment of the redistributive effects of the PIT. The assessment can be affected by the inadequacy of information in many ways. First, the reported data from our household survey underestimate the amount of paid personal income tax and thus underestimate the redistributive effects of the tax on inequality, all else being equal, because the degree of the distributional impact of taxes on inequality depends on the tax rate, as shown in equation (3). Second, there is a tendency that a higher proportion of individuals with lower taxable income do not report their taxes and this will overestimate the progressivity of the tax, thus over-evaluating the impact of the personal income tax on inequality. Finally, the inaccurate data in our

household survey could give a different ordering of individuals on the basis of the after-tax income, thus leading to erroneous estimates of the effects of horizontal equity, the first term on the right-hand side of equation (3).

The understatement of taxation in our dataset must be corrected in order to obtain a reliable assessment of the redistributive effects of the PIT in China. One way to deal with the inaccurate data is to apply the personal income tax schedule to impute the theoretical amount of tax liability, on the assumption that taxpayers paid all the taxes for which they were liable according to the composition of their income. Even though the imputed tax is unlikely to be identical to the taxes actually paid by each taxpayer, we believe that this is still better than the reported tax information in our dataset and can be used to evaluate the impact of the PIT on income distribution. The use of the imputed tax to evaluate the redistributive effect of taxes has the advantage that it provides estimates of the distributional impact of the PIT when it is fully implemented.

The personal income tax in China is currently implemented on an itemized basis. That is, the total income of individuals is subdivided into many components, to each of which different deductions and tax rates apply. In order to derive the tax liability from the available information on income in our dataset, the income information in our dataset must be consistent with the Personal Income Tax Law (PITL) in several respects, such as the subdivisions of the total income, the definitions of each income component, and the time period for which each income component is measured. We discuss below whether or not these requirements are met.

Regarding the subdivision of the total income and the definitions of its components, fortunately the components of the total income available from our household data are broadly consistent with the income categories in the PITL. Wages and salary, based on the PITL, had a monthly allowable deduction of 800 yuan in 2002 and 1,600 yuan in 2007, and taxable income, derived from the

monthly total of wages and salary minus the monthly deduction, is subdivided into nine income ranges. Increasing tax rates are applied to the nine income ranges, with the lowest at 5 percent and the highest at 45 percent. The wage and salary component of income is available in our data as a distinct component of the total income, which can be used to calculate the tax liability for this category of income. Other labor income is further divided into two parts in the PITL. One is the so-called individual service income, including income from a wide range of activities, such as designing, drafting, testing, medical practices, lecturing, and so on,[12] and the other is remuneration from manuscripts. In our dataset, however, the two parts are combined into one category. This does not matter, however, because the two parts have the same deduction, 20 percent of the amount received (for amounts of 4,000 yuan and more) or 800 yuan (for amounts of less than 4,000 yuan), and also the same tax rate is applied to each of them (20 percent of taxable income).[13]

Production and business income in the PITL broadly corresponds to the operational income from business in our dataset. Both define income as net income, that is, gross income less the costs spent for making the gross income. The category of income in the PITL called income from contracted or leased operations of enterprises/institutions does not correspond to the information in our dataset and thus is ignored in our calculations. Property income is divided into four categories in the PITL: (1) royalties, (2) interest, dividends, or bonuses, (3) rental income from leasing, and (4) income from the sale of property. Each of these four categories are available separately in our dataset. The definitions of property income in the PITL and in the dataset show that the coverage of each category of property income is broadly consistent.

Although the division of total income and the definition of each component of total income in our dataset are consistent with the PITL, the time-period for which the income is reported in our dataset differs from the time-period for which the taxable income is

measured and taxed for all components of income, except for the operating income (production and business income in the PITL). This presents a substantial obstacle in calculating the tax liability using our household survey data.

The PIT on wages and salary is charged on a monthly basis, whereas income in our dataset is annual income. In calculating the tax on wages and salary, we use the average monthly income from wages and salary, derived from the annual income divided by 12 (months), to estimate the amount of tax paid monthly. The monthly amount of tax times 12 (months) is used as the annual total of paid tax for this income component. The use of the average monthly wages and salary will underestimate the tax liability for this component of income, as it tends to overestimate the (monthly) allowable deduction and reduce the portion of income applicable to a higher marginal tax rate for this component of income. This is always the case whenever individual income varies across months in a year. The following example is illustrative.. Assume a person earns 6,000 yuan in wages in two months, 1,000 yuan in the first month and 5,000 yuan in the second month. The total individual tax liability according to the PITL is 360 yuan. The tax distribution between the two months is 0 in the first month and 360 yuan in the second month. However, the estimated tax liability based on the average monthly income will be 130 yuan, i.e., 65 yuan for each month. The imputed tax liability is much lower than the true tax liability. This is the case whenever an individual's wages vary across months.

For the other components of labor income (inclusive of the personal service income and the income from manuscripts), all the components of the property income (inclusive of royalties, interest and dividends, rental income from the leasing of property, and income from the sale of property), and contingency income and other income in the PITL, according to the PITL taxes are imposed on each single receipt, whereas only the annual totals of these income components are available in our dataset.[14] In order to calculate tax

liability on these income components we need to determine the number of times that individuals receive payments of each of these income components. The number of receipts for a given annual total of these income components will affect the deductions for these income components, but will not affect the tax rates applied to the income components, except for personal service income of more than 20,000 yuan in one receipt, because a uniform tax rate of 20 percent is applied to all these income components (see the Appendix to this chapter). Given the annual total of each of these income components, an increase in the number of receipts will increase the total amount of deductions, thus reducing the amount of paid taxes. This indicates that the current PITL provides taxpayers with an incentive to increase the number of times, whenever possible, that they receive a given amount of income. By doing this, their tax burdens can be reduced.

How do we determine the number of times individuals receive the given annual total of each of these income components in our dataset? Since housing rents dominate property leasing by households and payments of housing rent are normally made monthly, it is reasonable to assume twelve receipts per year for rental income from property leasing. With respect to interest from savings, based on current banking practice in China, interest payments are made quarterly for demand deposits, but only after the contracted period for fixed deposits. Dividend payments, if any (many corporations do not pay dividends for years), are normally made once per year, and there are very few cases where dividend payments are made twice per year. Therefore, it is reasonable to assume that individuals only receive interest and dividends once per year if they receive any of this type of income.

For the remainder of the income components for which taxes are charged on the basis of receipts, we assume twelve times if the individuals receive any amount of each of these income components. The reason for twelve times per year (or once a month),

rather than once a year, is that monthly is the commonly used time-span in accounting of economic activities, and the PITL provides an incentive, whenever possible, for individuals to make monthly rather than annual payments. Given the annual totals of each of these income components, the number of receipts differs among individuals. We ignore the differences due to a lack of relevant information. Below, in order to test the sensitivity of the estimates of the redistributive effects to the number of receipts, we provide alternative estimates based on the assumption of payments once per year, instead of twelve times per year, for all income components that are charged on a per receipt basis. This excludes two income components, that is, rental income from the leasing of property and interest and dividends, for which we assume twelve times per year for the former and once per year for the latter.

The operational business income available in our data is broadly in line with the production and business income subject to a personal income tax in the PITL, on the basis of both the time and definition of the income component. The annual income of the former is reported in our data, which is consistent with the time-span for which this income component is measured and taxed in the PITL. The operational income reported in our data is net income, that is, gross income minus costs incurred in the process of generating the gross income. Similarly, taxable production and business income is calculated as the total income minus the deductions for the cost of production and sales, which actually is net income. Because the two measures are consistent, the imputed tax reliability of this category of income should be more accurate than that of the other categories of income that are liable to taxes.

IV. Estimation of the Redistributive Effects of the Personal Income Tax on Income Distribution

In this section, we examine the redistributive effects of the personal income tax using the imputed tax estimates derived in the last section.[15] Because our purpose is to assess the impact of the personal income tax on the income distribution of the entire population, our analysis below covers all family members rather than only those family members who are working and paying an individual income tax.

Before presenting the MT index and its decomposition, we provide the average tax rate across deciles of per capita before-tax income in Table 10.5. With very few exceptions, the average tax rate increases as we move up the income distribution in both years under review, indicating a progressive individual income tax. This is not surprising since the statutory rate increases with income earned for most income components in the PITL. The average tax rate for the highest deciles was above seven times that for the lowest deciles in 2002. This ratio increased to 51.6 in 2007, suggesting an increase in the progressivity of the PIT between the two years.

It is worth noting that the average tax rate does not move up in a straight line along the deciles. It was slightly lower for the third decile than it was for the second decile in 2002, but it was much lower for the second decile than for the lowest decile. This is mainly due to the fact that the tax burden differs based on the income source, and the composition of the income source varies across deciles. In 2007, for instance, operating income constituted 10.5 percent of the total income for the lowest decile, but 7.1 percent for the second-lowest decile.[16] The same figures for property income are 0.41 percent and 0.31 percent respectively. However, the tax burden is much higher for property income and operating income than it is for other income sources, for instance, wages and salary. Defining the tax burden of a certain income component as the proportion of the tax charged on that income component of the total tax, on average the tax burden in 2007 was 21.3 percent for property income, 18.5 percent for operating income, and 3.4 percent for wages

and salary. Therefore, the reason why the average rate of the total tax for the lowest decile exceeded that for the second-lowest decile in 2007 is because for the lowest decile income components with high tax burdens constituted a larger proportion of total income.

<Table 10.5 about here>

We now report the estimates of the MT index and the P index. The relevant figures are summarized in Table 10.6. Most of the results in this table are expected, given the pattern of the average tax rate across deciles in Table 10.5. The Gini coefficient decreases after taxes in both years and the MT index takes a positive sign, meaning that the tax is equalizing. A rise in the MT index during the period under examination, from 0.0064 in 2002 to 0.0137 in 2007, indicates an increasing redistributive effect of the individual income tax on the inequality of urban households. The P index takes positive sign in both years, implying that the tax is progressive. This is not surprising given the rise in the average tax rate as we move up the income distribution. The increase in the P index between the two years, from 0.31 in 2002 to 0.33 in 2007, implies that the individual income tax in China became more progressive over this period.

The unexpected message, perhaps the most important message, conveyed by Table 10.6 is that the equalizing effects of the individual income tax on inequality are so small that the after- tax income inequality shows little improvement compared with that of the before-tax income. It is clear from the MT index that the tax reduced the Gini coefficient of before-tax income by only 0.64 percentage points in 2002 and by only 1.37 percentage points in 2007.

<Table 10.6 about here>

A decomposition of the MT index into the effects of horizontal equity and vertical equity provides some clues as to why the personal income tax makes only a minor contribution to inequality. The results of the decomposition are presented in Table 10.7. As shown, the measure of the horizontal equity is -0.0002 for both 2002 and 2007, meaning that the current personal income tax altered the ordering of individuals based on the before-tax income and violated the principle of horizontal equity, but not to a great extent. The violation of the principle of horizontal equity was mainly due to the different tax burdens of the different sources of income, as discussed above.

<Table 10.7 about here>

Given the negative but small values of the measures of horizontal equity, the MT index is very close to a measure of vertical equity. In other words, the degree of the redistributive effect of the personal income tax in China mainly depends on the degree of vertical equity. The effect of vertical equity, as shown in the last section, consists of two parts: the progressivity of the tax, measured by the P index, and the average tax rate. With the P index given in Table 10.6 and the average tax rate given in Table 10.5, the effect of vertical equity, as shown in Table 10.7, was 0.0066 in 2002 and 0.0139 in 2007. Although raising the progressivity of the tax may increase the redistributive effects of the tax, the small impacts of the current personal income tax on inequality were mainly due to the low tax rate.

This point becomes more evident from international comparison. Wagstaff et al. (1999) evaluated the redistributive effects of the personal income tax for twelve OECD countries on a comparable basis, using a similar methodology to that used in our study.[17]

According to their estimates, the concentration ratio of the personal income tax among the twelve OECD countries takes a minimum value of 0.3895, and a maximum value of 0.6628, with a simple mean of 0.5251. These figures are significantly lower than those in China, where the concentration ratio is 0.7574 in 2007 (Table 10.6). The P index, defined above as the concentration ratio of taxes minus the Gini coefficient of before-tax income, shows a similar pattern. For the twelve OECD countries it takes a minimum value of 0.0891, a maximum value of 0.2717, and a simple average of 0.1963, but in China in 2007 the P index has very high value of 0.4115. A comparison of the tax rates, however, shows the opposite pattern. The effective tax rate is very high in the OECD countries, with a minimum of 6.2 percent, a maximum of 32.7 percent, and a simple mean of 16.61 percent, but it is very low in China, at 3.27 percent in 2007. Although a comparison between China and other developing countries is difficult due to lack of data, there is still some scattered evidence available for this purpose. Bird and Zolt (2005), for instance, provide information on two ratios: the ratio of revenues from the personal income tax to GDP and the ratio of revenues from the personal income tax to fiscal revenues of the central government. These two ratios in 2005 are, respectively, 0.3 percent and 1.7 percent for China, 0.4 percent and 2.6 percent for Vietnam, 1.4 percent and 16.1 percent for India, 2.1 percent and 17.2 percent for the Philippines, and 2.7 percent and 14.7 percent for Malaysia. Thus China's personal income tax is relatively low compared to that in other Asian countries (the ratios for Korea and Japan are even higher).

One last task is a sensitivity analysis. In calculating the tax liability based on the individual income tax schedule above, we know that assumptions of how many times an individual receives payments of certain income components can affect the tax liability for every individual who has income from such sources. Estimations of the redistributive effects of these taxes are based on the

assumption that each of the income components was received once per month. In order to look at the sensitivity of the estimated redistributive effects of the tax to this assumption, we assume that individuals who have these income sources receive each of these income components once per year, with the exception of two of these income sources, that is, income from property rentals and income from interest and dividends.[18]

The results of these re-estimations show that the once per year assumption increases the average tax rate, but reduces the progressivity of the tax.[19] The MT index eventually became smaller, from 0.0064 to 0.0061 in 2002, and from 0.0137 to 0.0133 in 2007. The changes in the estimated MT index can be considered small, suggesting that the assumption regarding the number of times an individual receives an income component for which there are taxes does not greatly change the redistributive effects.

V. Conclusions

The purpose of this chapter is to evaluate the redistributive effects of the individual income tax. Due to the substantial understatement of the PIT in the CHIP urban dataset, we apply the official tax schedule to the reported components of income to impute the tax liability for individuals in our sample. Using this imputed tax liability, which measures the taxes individuals would pay if their taxes were paid according to the regulations, we calculate the MT index, the most commonly used measure of the redistributive effects of taxes and governmental subsidies, and we decompose the MT index into the effects of horizontal equity and vertical equity. The MT

index and its decomposition reveal that the personal income tax does reduce inequality, but the effect is negligible. The low average personal income tax rate is the main reason why the personal income tax fails to contribute more to improving inequality.

We note that our results are based on the assumption that individuals pay taxes according to the official income tax rates. In fact, actual tax payments are probably lower than those implied by the regulations. Also, the discrepancy between actual tax payments and the amounts owed according to the regulations is probably greater among higher-income individuals than among lower-income individuals. For these reasons, the redistributive impact of the personal income tax may be even weaker than what is implied by our estimates.

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Appendix

Table 10A.1. *Main elements of the personal income tax in China: Categories of income subject to the personal income tax by category, the time basis for the tax levied, deductions, and the tax schedule*

Category of taxable income	Basis on which the tax is levied	Deduction	Tax rate
Wage and salary income	Monthly	RMB 1 600	0 - 500: 1%; 501- 2 000: 10%; 2 001 - 5 000 15%; 5 001 - 20 000: 20%; 20 001 - 40 000: 25%; 40 001 - 60 000: 30%; 60 001 - 80 000: 35%; 80 001 - 100 000: 40%; 100 001 -: 45%
Production and business income	Annual	Costs	0 - 5 000: 5%; 5 001 - 10 000: 10%; 10 001 - 30 000: 20%; 30 001 - 50 000: 30%; 50 001 -: 35%
Income from contracted or leased operations of enterprises/institutions	Annual	RMB 1 600*12 months	0 - 5 000: 5%; 5 001 - 10 000: 10%; 10 001 - 30 000: 20%; 30 001 - 50 000: 30%; 50 001 -: 35%
Income from individual services	Per receipt	20% of receipts or RMB 800*	0 - 20 000: 20%; 20 001 - 50 000: 30%; 50 001 -: 40%
Remuneration from manuscripts	Per receipt	20% of receipts or RMB 800*	20%
Royalties	Per receipt	20% of receipts or RMB 800*	20%
Interest and dividends	Per receipt	No deductions	20%
Rental income from property leasing	Per receipt	20% of receipts or RMB 800*; taxes,	20%

		levies, and repair costs incurred	
Income from sale of properties	Per receipt	Original value of the property; reasonable expenses	20%
Contingency income	Per receipt	No deductions	20%
Other income that the MOF specifies as taxable		No deductions	20%

Note: * Whichever is higher.

Table 10.1. *Share of major taxes in total tax revenue in selected years after the 1994 fiscal reform*

Tax	1995	2000	2005	2007
VAT (Value-Added Tax)	44.4	36.9	34.7	31.6
Consumption Tax	9.3	6.8	5.3	4.5
Customs Duty	6.6	11.8	13.7	12.4
Business Tax	14.6	14.9	13.7	13.3
Corporate Income Tax	13.8	14.0	17.9	19.6
Personal Income Tax	2.2	5.2	6.8	6.4
Other Taxes	9.1	10.4	8.0	12.2
Total	100.0	100.0	100.0	100.0

Table 10.2. *Comparison of household data average tax rates and alternative data average tax rates*

Data source Year	2002	2007
Household data	0.33	0.85
Alternative data	2.95	3.60

Table 10.3. *Mean income and proportion of individuals (non-) reporting the personal income tax*

Quintile*	Mean taxable income (yuan/monthly)*	Number of observations (persons)	Proportion reporting tax (%)		
			No	Yes	Total
(2002)					
1	70	1029	84.7	15.3	100
2	215	1026	75.0	25.0	100
3	389	1028	63.3	36.7	100
4	657	1028	54.0	46.0	100
5	1,551	1026	46.2	53.8	100
Total	576	5137	64.6	35.4	100
(2007)					
1	143	1,345	79.3	20.7	100
2	461	1,325	67.7	32.3	100
3	894	1,334	49.6	50.4	100
4	1,623	1,335	37.6	62.4	100
5	3,938	1,334	28.0	72.0	100
Total	1,411	6,673	52.5	47.5	100

Note: * The mean taxable income is the gross monthly income minus the allowable deduction of 800 yuan in 2002 and 1,600 yuan in 2007. The quintiles are obtained based on the gross monthly income. The gross monthly income for each individual is derived from the annual income in our dataset divided by 12 (months). Ideally, the monthly gross income actually earned by individuals in a certain month should be used. This is impossible, however, because in our dataset we only have information on the annual wage and salary. But the mean monthly income still meets our requirements. This is because if the mean monthly income of an individual exceeds 1,600 yuan, then during at least one month in the year under review this individual must have earned more than 1,600 yuan, and this individual should report and pay the PIT.

Table 10.4. *Mean business operating income and the proportion of individuals (non-) reporting the personal income tax*

Quintile	Mean taxable income (yuan/annual)	Number of observations (persons)	Proportion of whether reporting tax (%)		
			No	Yes	Total
(2002)					
1	1,153	145	95.9	4.1	100
2	3,548	141	100.0	0.0	100
3	5,691	143	96.5	3.5	100
4	8,902	143	93.7	6.3	100
5	19,539	143	88.8	11.2	100
Total	7,760	715	95.0	5.0	100
(2007)					
1	154	119	94.12	5.88	100
2	486	111	93.69	6.31	100
3	1,046	121	89.26	10.74	100
4	2,089	109	91.74	8.26	100
5	7,069	115	84.35	15.65	100
Total	2,156	575	90.61	9.39	100

Table 10.5. *Average personal income tax rate by decile*

Decile	Tax rate (%)		Relative tax rate (lowest deciles=1)	
	2002	2007	2002	2007
1	0.60	0.15	1.00	1.00
2	0.71	0.18	1.18	1.22
3	0.70	0.35	1.16	2.33
4	0.77	0.52	1.29	3.45
5	0.86	0.76	1.43	5.05
6	1.21	1.16	2.02	7.71
7	1.40	1.65	2.34	10.98
8	1.53	2.40	2.56	15.98
9	2.34	3.48	3.91	23.23
10	4.25	7.74	7.10	51.62
All deciles	2.06	3.27	3.44	21.79

Table 10.6. *The MT index and the P index*

	2002	2007
Gini coefficient of pre-tax income (G)	0.3212	0.3459
Gini coefficient of post-tax income (G^*)	0.3148	0.3322
MT index (MT)	0.0064	0.0137
Concentration ratio of tax (C)	0.6330	0.7574
Kakwani index (P)	0.3117	0.4115

Table 10.7. *Decomposition of the MT index*
into the effects of horizontal equity and vertical equity

	2002	2007
MT index (MT)	0.0064	0.0137
Horizontal equity ($C_d - G^*$)	-0.0002	-0.0002
Vertical equity (=p*t/(1-t))	0.0066	0.0139

[1] The personal income tax is administered on the basis of the itemized components of the total taxable income. Income from other sources has different exemptions, deductions, tax rates, and so on.

[2] For a complete list of goods subject to the consumption tax, see *China Master Tax Guide* (2007).

[3] The corporate tax as a share of total tax revenue is based on the total revenue of the corporate tax paid by both domestic enterprises and FDI enterprises. Before 2007, the year under study, the corporate tax differed for domestic enterprises and for FDI enterprises, with preferential treatment for the latter. However, the two taxes have been integrated since 2008.

[4] A rigorous definition of the tax concentration ratio requires a concentration curve of the tax. The concentration curve is a curve with the accumulated share of the population sorted by income in ascending order measured on the horizontal axis, and the share of tax liability of the corresponding population measured on the vertical axis. The concentration curve is exactly the same as the Lorenz income curve, except that in the former the population is sorted by income, not by tax. The concentration ratio is computed on exactly the same basis on the concentration curve as the Gini coefficient is computed on the Lorenz curve.

[5] In a diagram of the Lorenz curve, the concentration curve lies farther away than the Lorenz curve from the diagonal, and therefore the area between the diagonal and the concentration curve is larger than the area between the diagonal and the Lorenz curve; in this case, the P index is positive.

[6] Note that the concentration ratio of after-tax income is derived from the concentration curve of after-tax income, and the concentration curve of after-tax income is plotted with the income units sorted according to before-tax income, not after-tax income.

[7] According to law, migrant workers in cities also have to pay personal income tax; however, income data from the migrant sample of the 2007 CHIP are given for the family as a whole, not for each of the family members. This presents an obstacle to estimations of the tax liabilities for wages and salaries, which are levied on an individual basis. For this reason, we do not incorporate migrants from the CHIP migrant survey in our analysis.

[8] It is worth noting that the accuracy of the tax data published by the SAT differs from tax evasion. It is widely believed that there is huge PIT evasion in China. This tax evasion, however, is irrelevant to the accuracy of the information on tax revenue actually collected and published by the tax authorities.

[9] The total gross income of urban households is derived from the gross urban income per capita times the total urban population.

[10] The average rate of the PIT is derived from the ratio of the total tax to the total gross household income (times 100). It is actually the weighted average of the PIT rate of each individual, with the income of each individual as the weight.

[11] One might argue that zero tax for a taxpayer with a positive taxable income could be due to tax evasion rather than non-reporting as we claim here. If this were the case, the average tax rate derived from our dataset would be close to that based on the macro data. However, this is not the case.

[12] For the difference between wages and salary and individual service income, see CCH (2007: 83).

[13] Refer to the Appendix to this chapter for details.

[14] The tax on income from contracted or leased operations of enterprises/institutions is charged on an annual basis, with a monthly deduction of 800 yuan in 2002 and 1,600 yuan in 2007. As noted in the text, this component is ignored in our calculations because it does not have a separate income component in our dataset.

[15] We also compare the estimated distributive effects between the imputed tax and the reported tax to determine how the reported tax information will bias the estimates of the progressivity and redistributive effects of the personal income tax.

[16] Here the total income includes transfer income, which is exempt from tax.

[17] The year under investigation in Wagstaff et al. (1999) varies by country, ranging from 1987 to 1993.

[18] We assume once per month for the former and once per year for the latter.

[19] The once per year assumption reduces the deductions, thus increases the tax liability, compared with the once per month assumption. This, combined with the fact that the income components on which the taxes are levied on a per receipt basis constitute a larger proportion of the total income for low-income households than for high-income households, reduces the progressivity of the tax.