

Estimation of Tax Revenue and Tax Capacity

By:

George Chun-Yan Kuo
Harvard University

Prepared for:

**Ministry of Finance
People's Republic of China**

Deloitte Touche Tohmatsu

July, 2000

Table of Contents

I.	Introduction.....	1
II.	Tax Capacity	2
III.	Macro-Based Forecasting Models.....	4
IV	Revenue Forecasting and Simulation Model of VAT	6
4.1	Background	6
4.2	Analytical Framework	7
4.3	Data Sources	9
4.4	Empirical Results	11
4.5	Applications	12
4.6	Concluding Remarks.....	13
V.	A Monthly Tax Receipts Forecasting Model	
5.1	Introduction.....	14
5.2.	Overview	14
5.3	Methodology for Monthly Tax Revenue Forecasting	16
5.4	Examples: Monthly Projection of Tax Revenues	18
5.4.1	Import Duties	18
5.4.2	Enterprise Income Tax	20
5.5	Concluding Remarks	22
VI.	Conclusions.....	22
	Appendix A: Fiscal Decentralization in China	23
	Appendix B: Preliminary VAT Revenue Simulation (1998).....	24
	Appendix C: Preliminary VAT Revenue under the Proposal Tax System (1998).....	29
	Appendix D: Parameters for Import Duty Receipts Model	33
	Appendix E Parameters for Enterprise Income Tax Receipts Model.....	33

Estimation of Tax Revenue and Tax Capacity

George Chun-Yan Kuo

I. Introduction

Each government levies taxes in order to finance programs that are important to its fellow countrymen. Without a stable and reliable tax system, the government's ability to maintain these programs is impaired. To ensure a healthy and sound financial position, the government must monitor not only the expenditure but also the collection of tax revenues on a regular basis.

Tax revenues usually move in tandem with economic performance. In most advanced countries, there is a unit in the government that employs professionals to monitor the GDP and other major economic indicators, as well as to make economic forecasts of these economic indicators. With these forecasts, the government also develops various macro-based models or micro-simulation models to forecast tax revenues for each budget. Various tax calculators are also employed to simulate the revenue implications when the government proposes changes to the current tax policy. The methods have been progressing as the demand for better revenue forecasting increases and as computer facilities improve.

Like other countries, China has several institutes that make economic forecasts of GDP and other major components on a regular basis. These include the State Planning Committee, the National Development and Research Center, and the Department of Planning and Statistics in the State Administration of Taxation (SAT). It is the Department of Planning and Statistics of the SAT which makes estimations of tax revenues during the budget process.

As a socialist country in the past, state-owned enterprises in China used to dominate the economic activities of the country, and it is still the case today even though private and foreign enterprises have begun to play an important role in the marketplace. In a planned economy, production is key to the economy. Whatever is left over after production costs and various expenses are considered profit that belongs to the government. Enterprises may retain part of the profit for the company and contribute the remainder to the national treasury. Taxation is a rather new concept.

The demand side of the economy or expenditures, including sales taxes on commodities, have also started to receive attention by the government. In any event, the behavioral responses of enterprises and households to taxation are still in a transitional stage. Nevertheless, the government has begun its research in taxation, including the modeling of revenue estimation and forecasting. The general approach focuses on the projection of industrial output and value added by sector and by province or region. With

this information, the government attempts to determine the tax capacity. In addition, the SAT has also estimated a single overall tax elasticity with respect to the GDP, while making projections of the total tax revenue in the country.

The main objective of this report is to present a general approach for forecasting tax revenues in advanced countries, to introduce a methodology for estimating tax revenues under the current law and proposed changes in the law, as well as to develop a short-term model for monitoring revenue. Section II deals with issues regarding the concept and estimation of tax capacity. Section III describes an aggregate model for forecasting tax revenues undertaken in developed countries and their application to China. Section IV develops the conceptual framework of a VAT model that can be used to estimate the potential tax base and associated revenues for VAT in China. The model is designed to simulate the revenue implications if tax policies are changed as well as to forecast the potential revenues for future years. Section V introduces a short-term revenue forecasting and monitoring model for each major tax, so that the tax agency can monitor the tax collections closely. Conclusions are presented in the last section.

II. Tax Capacity

There appears to be no single concept of tax capacity. It can be interpreted as the taxpayer's ability to pay or the government's ability to raise tax revenue. The first can be related to income, expenditures, property and wealth of individuals or enterprises. The issue becomes not only the tax revenue that can be raised in the country but also the efficiency or deadweight loss of the tax system. The second is further complicated by the government's willingness to tax and its ability to administer and collect taxes under a particular set of tax laws and regulations in a country.

Because tax capacity is a difficult concept, estimation of the potential tax liability becomes even more complicated to undertake objectively. Examples include the kind of taxes that should be included, the tax bases, the tax point, the tax rates, whether the tax is progressive or not, issues of fiscal decentralization, as well as comparison with other countries or regions in similar economic condition.

The fiscal decentralization in terms of different tax jurisdictions complicates the Chinese tax systems. For example, the SAT administers the VAT system, but only 75% of the collected revenues are allocated to the central government, while 25% belong to local governments. In the case of personal income tax, the SAT administers the tax imposed on interest in banks, financial institutions and savings deposits, while the local tax authorities collect interest income on loans to enterprises and all other personal income taxes. The details of tax administration and revenue allocations are summarized in Appendix A. The different tax administration machinery has varying impacts on tax collections and implications for tax capacity, depending on the relative administrative efficiency of each administration.

In reality, the tax capacity of a country has a lot to do with the share of income or wealth that can be imposed and collected as taxes in the country. This depends upon the

characteristics of the country's economy and the sources of government revenue. Characteristics include per capita income, ability to export in manufacturing and natural resource sectors, the relative importance of agricultural sectors in the economy and so on.¹ The natural resource sector is treated separately because of potential rents that can be collected in this sector from exports. Agriculture is a sector in which taxes are generally difficult to impose, and thus the sector is expected to have a negative relationship with tax capacity.

Suppose that T/Y stands for the tax capacity of a country, which is measured by the ratio of the actual tax revenue (T) to national income (Y) of that country. National income can be measured by GNP. The relationship of tax capacity and various characteristics can be expressed in the following mathematical form:

$$T/Y = f(Y/N, E/Y, R/Y, A/Y) \quad (1)$$

where Y/N represents income per capita, E/Y the ratio of exports excluding natural resources to national income, R/Y the share of exports from natural resources in the national income, and A/Y the ratio of agricultural output to national income.

Equation (1) can be estimated from the cross-section country data. The tax capacity of the country in question is then estimated based on its income per capita and other economic characteristics. If the ratio of the actual to the estimated tax revenues is less than one, it implies that the government should be able to change its tax base, tax rates, or a combination of both to raise its tax revenues without much difficulty. On the other hand, if the ratio is greater than one, it means that its tax system, together with the tax administration, has raised more revenues than its counterparts in collecting taxes. The exercise is essential in order to estimate a country's potential to collect tax revenues given the same kinds of characteristics as other countries.

The tax capacity can also be measured for each tax and compared among different countries. This has been examined for the case of VAT in central and eastern European countries by some researchers.² However, the lack of detailed information on tax laws, regulations and consumption patterns among countries make conclusions difficult.

In China, there are also many special provisions contained in each of the major tax systems. VAT, for example, is not a comprehensive consumption tax, because main services are levied under the separate business tax. In the case of the enterprise income tax, the treatment differs for domestic and foreign enterprises. Special tax incentives are also provided for foreign investment enterprises only. These provisions make the estimation of potential tax capacity complicated and difficult to interpret.

¹ See, e.g., A. R. Prest, "The Taxable Capacity of a Country", in J. F. Toye, (ed.), Taxation and Economic Development, (London: Frank Cass, 1979), Chapter 1.

² William Jack, "The Efficiency of VAT Implementation: A Comparative Study of Central and Eastern European Countries in Transition", working paper prepared for the International Monetary Fund, (July 1996).

That said, one way to investigate the tax capacity of a major tax in a country is to compare the difference between the actual revenue and the potential revenue of a tax based on the tax laws and regulations. In this paper, we have measured the tax capacity through the tax compliance of the VAT system in China. The results are interesting and will be presented in Section IV.

III. Macro-Based Forecasting Models

The tools which most developed countries use to forecast various tax revenues consist of macro-based models. The models identify the tax base for each tax and its relationship with other economic variables in the economy in order to determine the extent to which tax revenues can be generated.

The methodology is based on the historical performance of tax collections and economic activities, as well as on forecasts of key macroeconomic variables, usually made by the Ministry of Finance. Three steps are usually involved. The first is to compile a time series of tax revenues for each tax. The second is to quantify their legal tax bases and to collect information on the tax base from which these taxes were collected, but often proxies for such taxes are used. The tax bases are generally obtained from macroeconomic variables derived from national accounts, balance payments, labor force, and other relevant economic data. The third step is to examine the response of tax receipts to the amount of the tax bases such as income, expenditures, imports and so on by regression analysis. The models used to project tax revenues with respect to GDP, which is generally available in the economic forecast, are employed. Two elasticities must be estimated. They are the elasticity of tax revenues with respect to the tax base identified and the elasticity of that tax base with respect to GDP. Given the forecast of GDP, the product of the two elasticities measures the change in tax revenues.

It is important to note that the historical data series of estimating tax revenues include the effects of national income, expenditures or other variables as well as discretionary changes in tax policies made in budgets over the years. In making revenue forecasts, one must segregate the pure response of the tax revenues to increases in the tax base -- i.e., tax elasticity -- from changes in revenues brought about by discretionary changes in budgets. The general methodology for estimating tax elasticity is to construct a tax revenue series by adjusting for the effects of discretionary changes which are introduced in the budgets over time.³ The adjusted tax revenue will then be regressed for national income, expenditures or other tax bases in order to derive the tax elasticities.

The Congressional Budget Office in the U.S. projects revenues for each tax using statistical estimation techniques.⁴ The models use aggregate input variables such as

³ The approach is called the proportional adjustment method. See, for example, International Monetary Fund, "Revenue Forecasting", IMF Institute Financial Policy Workshop: the Case of Kenya, (Washington, D.C., 1981).

⁴ See, e.g., Rosemary Marcuss, "Overview of the U.S. Federal Tax System and the Construction of the CBO Tax Receipts Baseline", paper prepared for the Congressional Budget Office, (June 1997).

GDP, wages and salaries, interest income and dividends, corporate profits, fixed investment, imports, GDP price deflator, etc. to forecast various tax liabilities. Once tax liabilities are estimated, tax revenues can be projected with historical information about the timing of tax payments. For example, corporate liabilities are estimated as a function of independent variables including top statutory tax rate, adjusted corporate profits, and dummy variables for years with major tax reforms.

In the case of projecting VAT revenues in Canada, the VAT revenues are estimated using a function of personal consumption expenditures and business fixed investment. The former represents the potential tax base, while the latter reflects a negative relationship with tax revenues because of input tax credits on fixed investment, which can be claimed by businesses to offset their net VAT payment to the government. To project tax revenues in future years, the Ministry of Finance uses forecasts of personal consumption expenditures, business investment, and other macroeconomic variables generated by the quarterly macro econometric models developed in the department.

In China, there are no national data made available on wages and salaries, gross profits, or national income from national accounts. This has restricted our analysis in the area of personal and corporate income taxes. In addition, since estimates of changes in the tax revenues as a result of discretionary changes in prior years' budgets are not available, only tax buoyancies instead of tax elasticities can be estimated. As the revenue forecasting system matures in China, the database should be constructed to identify the changes in revenue by tax due to discretionary tax policy changes in budgets. When this information become available over time, tax elasticity rather than buoyancy measures can be estimated.

As an example, we tried to estimate the revenue from import duties. First, we determined how the quantity of imports corresponds to changes in the GDP and to changes in the relative price of imports versus domestic goods. Secondly, we looked at how tax revenues respond to changes in the volume of imports, which is considered an appropriate tax base. The results showed that, over the period 1985 to 1997, the import elasticity with respect to GDP was found to be 1.20, while the price elasticity for imports was about -0.60.⁵ Both variables were found to be statistically significant at 1 percent. However, we did not find reasonable estimates for the elasticity of tariff revenues with respect to imports, because of the fact that the Chinese economy has only recently changed from a socialist to a market economy, our estimates being tax buoyancy rather than tax elasticity, etc. In making forecasts of revenue from import duties, we may assume unity elasticity or other numbers at this stage for the purposes of forecasting.

⁵ The regression results are shown below:

$$\begin{aligned} \text{Ln}(\text{Real Imports}) &= -1.1036 + 1.1996 \text{Ln}(\text{Real GDP}) - 0.5961 \text{Ln}(\text{Relative Prices}), \quad R^2 = 0.9563 \\ &\quad (1.22) \quad (13.76) \quad (2.78) \\ \text{Ln}(\text{Real Import Duties}) &= 6.5726 - 0.1667 \text{Ln}(\text{Real Imports}), \quad R^2 = 0.1886 \\ &\quad (7.74) \quad (1.60) \end{aligned}$$

where parentheses indicate the t-statistic of the coefficients.

Because we had no national data on wages and salaries or personal income, we ran a regression analysis of personal income tax on GDP. The tax buoyancy is estimated as high as 3.1 for the following reasons.⁶ First, as the national income grows, more people will fall into the personal income tax net. Second, the personal income tax rate structure is progressive in the tax system. Third, the government has strengthened the tax administration. Fourth, no discretionary changes are accounted for in the estimation, and as a result, tax buoyancy was estimated. Tax elasticity is the one measure that should be used in revenue forecasting.

Looking ahead, as China moves from a planned economy to a market economy, national accounts should collect more information such as wages and salaries, personal interest income, dividend income, gross corporate profits, etc. The government should also estimate revenue gains or losses for each tax due to discretionary policy changes in each budget so that the tax elasticity can be properly measured to reflect the behavioral response of the tax revenue to the tax base. Then macro-based models may be used to forecast tax revenues.

In addition to macro-based models, some countries have also started to develop microsimulation models to forecast corporate income tax revenues.⁷ With this approach, the model first forecasts the tax liability for each enterprise, which involves the projection of the gross revenue and various deductions for each sampled company according to the tax laws and regulations. This approach takes into account the special features of each company, such as the loss carried forward, making for more precise revenue forecasting. The second step projects the tax liability into tax collections. This approach is still in its infancy, because of difficulties in projecting revenue at individual company levels.

IV. A Revenue Forecasting and Simulation Model of VAT

In this section, we develop an analytical framework that can be used to estimate the potential tax base and associated revenue for VAT in China. The model is fairly detailed in design in terms of commodity categories in order to simulate the revenue implications for changes in tax policies, as well as to forecast potential revenues in future years.

4.1 Background

China introduced a VAT system in January 1994. The current VAT collected in China in fiscal year 1998 was about 387.0 billion yuans, which accounts for approximately 40 percent of the entire country's tax revenue. It is the single most important revenue source.

⁶ The regression results for individual income tax are shown below:

$$\text{Ln(Real Individual Income Tax)} = -27.7018 + 3.0866 \text{ Ln (Real GDP)}, R^2 = 0.9385$$

(12.08) (15.53)

where parentheses stand for the t-statistic of the coefficients.

⁷ See, e.g., Michael Zeithofer, "The Australian Company Income Tax Microsimulation Model", (June 1997).

The VAT in China is levied on the sale of goods and the provision of certain services, such as processing and repairs, as well as on the importation of goods. The tax is applied to the sale of goods and services at all stages of the production and distribution chain. At each stage, vendors are able to claim tax credits to recover the tax they paid on their business inputs. As a result, the tax system applies the tax only to the value added by each vendor. Since the only tax that does not get refunded is the tax imposed on final consumption, the end user bears the tax on the value of the goods.

Like most countries which have a VAT, China does not tax a number of important goods and services because of political and socioeconomic considerations, technical difficulties, or administrative complexity. In addition, China does not tax certain important services because these services are subject to business tax, which does not have the credit system of the VAT. Therefore, inputs used to produce these services are not eligible for tax credits. Moreover, VAT paid on fixed assets is not eligible for tax credits against output tax for the taxpayers.

The tax rates in China are multiple. The standard tax rate is 17 percent and applies to most goods and services. However, certain items are subject to lower tax rates. For example, a 13 percent tax rate is levied on foodstuff and natural resources. In the case of small businesses, they do not charge VAT on sales of goods or services, nor do they receive credits on taxes paid on their business inputs. However, they are required to pay VAT at 6% or 4% of gross sales, depending upon whether they are providers of goods or services.

Unlike the situation in most VAT countries, exporters are not fully credited for the taxes they pay on their business purchases. They are credited or refunded at lower rates. As a result, exporters have to absorb the tax or try to pass the tax on to their foreign clients or back to domestic wage earners. These credited or refunded rates have been changed several times in recent years. China is now moving toward raising the rates of business inputs which are eligible for credits in order to improve the ability of exporters to compete in international markets.

4.2 Analytical Framework

The potential tax revenue of a VAT is dependent on a number of factors, such as how broad the tax base is, what the tax rates are, and the extent to which businesses comply with the tax.

The VAT in China is, in certain respects, similar to a European-style VAT. Imports are taxed in the same way as domestically produced goods. Exports are not subject to tax. Thus, the VAT in China imposes a tax in principle at the final destination. Since the only tax that does not get credited is the tax imposed on final consumption, the tax essentially applies to goods and services consumed domestically. Therefore, in principle, estimating the value of goods and services purchased by final end users automatically captures the tax base under VAT.

As described earlier, some goods and services are either zero-rated or tax-exempt. For zero-rated goods, the VAT is not levied on the selling price of these items. The vendor in most VAT countries receives full credit for the VAT paid on inputs used in production. As a result, the government collects nothing from exported goods and services. However, the system in China provides a partial credit at lower rates on inputs the vendor has paid. The government collects some revenues related to exported goods and services this way, although admittedly the level is declining.

In the case of tax that is exempt due to political and technical difficulties or for those services that are subject to business tax in China, the goods or services are not taxed, but the taxes paid on business input purchases are not credited. The producers of these goods or services are, for all intents and purposes, end users and, therefore, their business purchases form part of the tax base under VAT. For administrative and compliance purposes, China also exempts small businesses from the tax, and they are also considered final consumers. After all, the denied input tax credit forms part of the tax revenues. The exception is that the input tax credit is provided in China for purchases of special items, such as tax-exempt agricultural products and freight charges paid by taxpayers. These provisions somewhat offset the tax revenues received by the government.

The tax system in China does not allow taxpayers to claim input tax paid on fixed assets even though they are considered to be business purchases. Therefore, the denial of input tax credits on business purchases of fixed assets also increases the tax revenue for the government.

In summary, the total potential VAT tax base includes taxable goods and services purchased by final consumers, the government and producers of tax-exempt commodities and services. This can be broken down into the following three components: sales to the final consumer and the government,⁸ business purchases used in the production of exempt goods and services, and business purchases of fixed assets. Expressed in mathematical form, the total potential VAT base (TB^{vat}) can be written as follows:

$$TB^{vat} = \sum_i B_i + \sum_j \omega_j K_j + \sum_f A_f \quad (2)$$

where B_i is the sales tax-exclusive base of the i th commodity to consumers and governments, K_j is the total business intermediate inputs used in the production of the j th exempt sector, ω_j is the ratio of taxable inputs to the total inputs used in the production of the j th exempt sector, and A_f is the sales tax-exclusive value of the f th fixed asset to business. It should be noted that not the entire intermediate inputs are subject to VAT and therefore ω_j is needed for that consideration.

⁸ Wages and salaries paid to civil servants are not part of the VAT base.

If there is a single VAT rate, the potential tax revenue can be calculated by a simple multiplication of the tax base (TB^{vat}) and the tax rate. Since China has multiple tax rates, equation (2) should be modified to accommodate the multiple rates.

With the multiple tax rates, the potential tax revenue (TR^{vat}) can be expressed as follows:

$$TR^{vat} = \sum_i \tau_i B_i + \sum_j \sum_i \tau_i \omega_{ij} K_j + \sum_f \tau_f A_f \quad (3)$$

where τ_i is the i th tax rate applicable to the i th commodity, ω_{ij} is the taxable proportion of the total business intermediate inputs purchased by the j th exempt sector in which inputs are subject to the i th tax rate, and τ_f is the f th tax rate applicable to the fixed asset.

Finally, the total expected tax revenues over all commodities and all entities are usually not the same as the actual tax collections. This is a result of a number of factors, such as incorrect measurement, bad debt allowances, tax-free allowances from small, imports, tax evasion, small suppliers' exemptions, and the inability of the tax administration to fully administer the tax system.⁹ To arrive at the realistic tax revenues, the potential tax revenues (TR^{vat}) as shown in equation (3) must be multiplied by the compliance rate. The compliance rate can be determined from the difference between expected and actual collections for prior years in the country.

4.3 Data Sources

China has a complicated VAT system, and it requires comprehensive data in order to capture the tax base and associated tax revenues. As discussed earlier, the calculation of the VAT base involves not only the final consumption expenditures by households and governments, but also the business purchases of intermediate inputs and capital goods.

We have examined three possible data sources for the analysis. First, the Household Survey in China provides comprehensive detailed family expenditures for goods and services.¹⁰ Those expenditures are separated for urban residents and rural residents. If the survey were designed properly, the sample data could be the primary source of the data for analysis. However, part of the tax base under the Chinese VAT system is denied tax credits on business inputs used to produce tax exempt goods and services. Thus, the household survey alone does not provide sufficient data for our purposes.

Second, the Survey of General VAT Payers provides detailed annual information on output VAT and input VAT at the applicable rates, other commodity and income taxes, and other financial statements of enterprises. The data is enormous because of multiple rates, input tax and output tax associated with each enterprise. Using this data in our tax revenue analysis is cumbersome and tricky because output tax in one firm can be

⁹ For small suppliers' exemption, we may be able to estimate the size of this sector by analyzing data from the Survey on General VAT Taxpayers.

¹⁰ See, for example, State Statistic Bureau, "Survey on Consumption Expenditures for Urban Residents".

equivalent to input taxes in other firms. In this case, they must be cross-checked and offset each other between VAT registrants for our purposes. This complicated exercise, however, may not be necessary, if using the approach with input-output tables, because of the nature of the VAT systems.

Third, the input-output tables display inter-industry transactions and final demand expenditures -- by household, government and business -- in the economy. The data is comprehensive and detailed. It is considered the main source for the framework outlined in Section 4.2.

The latest input-output tables in China are compiled for 1997 with 124 commodity sectors.¹¹ The table consists of three parts. The first part is a matrix of intermediate inputs with identical commodity sectors in the rows and columns. Our interest lies in the columns of intermediate uses that represent the amount of goods or services required for producing the column of output industry in the economy. It should be noted that the data in intermediate uses are inclusive of VAT paid. With the 124 detailed commodity sectors, the data provides information to determine whether each intermediate business purchase is subject to VAT, and at which tax rate.

The second part of the input-output table is a matrix of various commodity sectors and various categories of final demand such as private consumption, government expenditure, gross capital formation, exports and imports. This part of the table represents the gross expenditure on various goods and services purchased by the final demand category entities for their own consumption and not for producing supplies of a commercial nature. The value of goods and services purchased by households includes imports and, thus, automatically captures the destination principle of the VAT and domestic consumption under the VAT system. It should be noted that zero-rated and tax-exempt commodities or services are not part of the tax base and neither is their tax revenue. However, for tax-exempt goods or services, there is a corresponding output sector in which the required intermediate inputs form part of the tax base.¹²

Government expenditures are treated in a fashion similar to private consumption under the VAT system. However, the data shown in the input-output tables are aggregate in function and inclusive of wages and salaries paid to civil servants. This value added has to be excluded from the VAT base, and the remainder is allocated by commodity according to the structure of the intermediate use matrix.

¹¹ China keeps its I/O tables quite up-to-date. The first I/O table was developed for 1981 (26 material production sectors), and the 1983 tables were extended from the 1981 tables. The 1987 tables had 118 sectors (including non-material sectors), and the 1990 tables (33 sectors) were extended from the 1987 tables. The 1992 tables had 119 sectors, including an additional sector on waste material, and the 1995 tables were extended from the previous tables with 33 sectors. The latest 1997 tables have 124 sectors. National Bureau of Statistics, Department of National Accounts, Input-Output Table of China, (China Statistics Press, September 1999).

¹² The Household Survey could potentially supplement the data used in the analysis if the survey were designed properly and the data were made available.

Unlike most VAT countries, the input tax paid on the purchase of fixed assets by any business is denied tax credit in China. However, certain items such as breeding stock, milk and recreational animals, newly increased forest and works of arts are not taxable under the VAT and do not generate tax revenues. As a result, most of the gross capital formation shown in the final demand matrix forms part of the VAT base in China.

Furthermore, the tax system in China provides input tax credit at 10% of the actual purchase price of tax-exempt agricultural products and 7% of freight charges paid by taxpayers against their output tax for the relevant period. The relevant producers are those in commodity sectors whose output is liable for tax. This data can be calculated from the intermediate use columns in the matrix.

4.4 Empirical Results

The summary results are presented in Appendix B. The data are arranged into four major categories – private consumption, government expenditure, tax base associated with the exempt commodity sectors, and tax base associated with denied input tax credits for the purchase of fixed assets. Column (1) represents the gross expenditures on various commodities by consumer, government or business in 1997. These expenditures are then extrapolated to 1998 by using the respective growth rates. They are 5.93% for private consumption, 8.71% for government expenditures and 12.3% for gross fixed capital formation. In the case of the tax base associated with the exempt commodity sectors, the growth rate varies according to whether the sector belongs to the primary industry (2.73%), secondary industry (3.95%), tertiary industry (13.36%) or construction (9.40%).¹³

Column (3) shows the taxable proportion of expenditures by specific commodity. In the case of the business tax base associated with the exempt commodity sectors, it is calculated from the 1997 Input-Output Tables as the percentage of the total intermediate inputs that are subject to VAT. For the government sector, the percentage is further adjusted for wages and salaries that are not liable to the tax. Column (4) shows the applicable tax rates.

Column (4) presents the potential tax base associated with each commodity sector. As the gross expenditures shown in Column (1) are the tax-inclusive base of the commodity, the potential tax-exclusive base for various commodities and various entities is presented in Column (5).¹⁴ The results in Column (6) are a simple multiplication of the potential tax base by the relevant tax rates.

The sum of the above potential VAT revenues for all commodities and entities is 620,457 million yuans in 1998. It is interesting to observe that the tax revenues generated from household consumption accounts for only about 46.0%. The denied input tax credits associated with business purchases on either intermediate inputs or fixed

¹³ See National Bureau of Statistics, *China Statistical Yearbook 1998*.

¹⁴ The value added taxes are assumed fully shifted forward.

assets account for as much as 46.8%. This arises from a substantial amount of tax exemption, including those services that are subject to the business tax instead of VAT.

The above potential tax revenue for 1998 is greater than 387,000 million yuans of the actual tax collections in 1998, due to such factors as tax-free allowances for various small imports, small suppliers' exemptions, tax evasion, weak tax administration and inaccurate measurement of data. This implies that the overall compliance rate is approximately 62.4%. It should be noted that the current system in China has not provided full input tax credits on business inputs used in the production of exports. This has not been taken into account in the empirical results, because of lack of data in the area. However, the Chinese government has gradually raised export VAT rebate rates. For example, export rebates for garments recently increased from 13% to 17%. This suggests that the overall compliance ratio may be only slightly lower than 62.4%.

In any event, one has to take into account the compliance ratio when making revenue forecasts for future years and when estimating realistic revenue implications for changes in tax policies.

4.5 Applications

There are several potential applications of this model.

First, the model can be used to forecast VAT revenues based on a macroeconomic forecast of the GDP growth rate and various components. For example, suppose that the Ministry of Finance forecasts the GDP real growth rate in 1999 at 7.5%, consisting of 7.0% private consumption, 9.5% government expenditure and 13.5% gross capital formation. In addition, the Ministry also forecasts the growth rate by industry, with 3.0% for primary industry, 4.5% for secondary, 15% for tertiary and 10% for the construction sector. What will the potential revenue collections be for 1999?

Given the forecasts of the above growth rates, one can estimate gross expenditures by commodities and entities for 1999, as shown in Column (2) of Appendix B. The model can project the VAT revenues in 1999 at approximately 425,141 million yuans.

Second, the model can also be used as a tax calculator to simulate the VAT revenue implications if the government considers alternative policy options. For example, telecommunication services are currently exempt under the VAT, but what would the tax implications be if the services were to become taxable at the standard rate?

In this case, two changes should be made to the model (see Appendix C). The first is an increase in revenues collected from the expenditures made by households and governments (4,580 million yuans). The other is a reduction of tax revenues due to input tax credits being made available to the telecommunication businesses in this proposal (5,947 million yuans). However, this reduction is offset by an increase in input taxes paid on telecommunication services by sectors that produce exempt products (3,639

million yuans). The model suggests that the government would forgo less tax revenues in the currently denied input tax credits (2,308 million yuans) than it would collect from the additional tax revenue from households and governments (4,580 million yuans). The detailed changes in revenues expressed in millions of yuans are shown in Table 1.

Table 1
Revenue Comparison between Current and Proposed Tax Regimes

<u>Categories</u>	<u>Potential Tax Revenues</u>			<u>Estimated Tax Revenues with 62.37% Compliance</u>
	<u>Existing Tax System</u>	<u>Proposed Tax System</u>	<u>Change in Revenues</u>	
Private Consumption	285,562	289,715	4,153	2,590
Government Expenditures	44,249	47,439	3,190	1,990
Business: Denied Input Tax Credits				
- Telecommunication Sector	9,535	-	(9,535)	(5,947)
- Other Sectors	160,848	166,682	5,836	3,639
Sub-total	170,383	166,682	(3,701)	(2,308)
Business: Denied Tax Credits on Assets	120,264	120,264	-	-
Total	620,458	624,100	3,642	2,272

The net result is positive revenue in the amount of 2,272 million yuans. This is based on the assumption using the general compliance ratio of 62.37%. Because telecommunication services are likely to be regulated, one would expect a much higher compliance tax ratio for this service, and thus our figure would be a conservative estimate.

It should also be noted that telecommunication services are currently subject to business tax. Presumably, a sensible proposal would be to substitute the VAT coverage for the business tax. Thus, the revenue effects indicated above do not take into account the reduction in business tax that may be associated with an effort to make telecommunication services taxable under the VAT at the standard rate.

4.6 Concluding Remarks

In this section, a model has been developed to estimate the VAT base and associate revenues in China. The model is quite comprehensive and fairly detailed so that it can be used to forecast revenues in future years and to assess the revenue implications if the government considers changes in policies regarding the treatment of major commodities and sectors.

The preliminary results show that there is a significant amount of the current VAT currently imposed on intermediate inputs and fixed assets purchased by businesses. The tax cascading is extreme in the system. The model also suggests that the general compliance rate of the VAT in China is approximately 62%. Efforts to improve the rate of tax compliance seem to be in order.

Having said this, the model developed in this report is considered preliminary and should be improved with additional data, such as the extent to which exporters cannot claim taxes paid on their business inputs.

V. A Monthly Tax Receipts Forecasting Model

5.1 Introduction

At the beginning of each fiscal year, the Ministry of Finance (MOF) in China will set a revenue target for each tax for the State Administration of Taxation (SAT) to collect. For monitoring purposes, the monthly collections in any specific month, the projected revenues for the remainder of the year and the estimated surplus or deficit by tax can be extremely valuable information to the Ministry of Finance and the tax agency.

The purpose of this section is to help China develop a short-term revenue-forecasting model for each of the major taxes so that the tax agency can monitor the tax revenue collections closely. This report first sets up a summary table of monthly tax revenues for various taxes at a particular point in time and then presents a general methodology to forecast monthly revenues for the remainder of the year. Several numerical examples for specific taxes are also presented. Since data on monthly revenues is not available at the time of writing of this report, we will construct artificial data for illustrative purposes.

5.2 An Overview

Let us use July 1999 for the reference month. Table 2 presents an assumed set of summary monthly information for various tax revenues as of July 1999 in China.¹⁵ Column (1) shows the revenue targets for each tax set by MOF at the beginning of the fiscal year 1999. The figures remain unchanged throughout the fiscal year. Column (2) presents the actual revenues collected in July. Column (3) shows the actual revenue collections until July. Column (4) indicates the outstanding balance of the projected revenues that are yet to be collected as of the end of July. Column (5) presents the projected revenues by the tax agency for the entire year. The method for making this projection will be explained in the next section. Column (6) shows the estimated surplus or deficit between the projected revenues from the tax agency and the targets set by MOF.

This table provides the government with a clear picture of tax revenues at a particular point in time. It also provides the tax agency or the respective department with a useful tool for monitoring the actual tax collections against its own projections as well as against the targets set by MOF. For example, the Department of Customs collected 2,950 million yuans in July 1999. As of the end of July, the total collection of import duties amounted to 17,085 million yuans and thus, 15,782 million yuans was yet to be

¹⁵ The figures in this table are presented for illustrative purposes. Nevertheless, the relative importance of the tax collections among taxes may be not far from reality.

collected for the remainder of the year. The table also indicates that the amount projected by the SAT is short by 2,133 million yuans when compared with the annual target set by MOF. An interesting question in this example is why there is a discrepancy in estimates between MOF and SAT. Part of the reason is that MOF tends to set the targets higher because of pressure to increase revenues and because of its belief that the tax agency can do better.

Table 2
Tax Revenues as of July 1999
(100 million yuans)

Tax	MOF Target For Year (1)	Revenues: this Month (2)	Revenues: Year to date (3)	Projected Revenues: Remainder of the Year (4)	Projected Revenues: Total Year (5)	Estimated Surplus (Deficit) For Year (6)
Import Duties	350.00	29.50	170.85	157.82	328.67	(21.33)
Individual Income Tax	475.00	38.00	195.00	205.00	400.00	(75.00)
Enterprise Income Tax	1,030.00	59.00	529.00	457.62	986.62	(43.38)
VAT	4,800.00	410.00	2,650.00	1,700.00	4,350.00	(450.00)
Business Tax	1,800.00	175.00	1,100.00	650.00	1,750.00	(250.00)
-	-	-	-	-	-	-
-	-	-	-	-	-	-
-	-	-	-	-	-	-
Total	12,500.00	1,050.00	5,900.00	5,350.00	11,250.00	(1,250.00)

One can also express the tax revenues for each tax as a proportion of the total tax revenues, as shown in Table 3. This table displays the shares of each tax in terms of total annual targets set by MOF (Column 1) and of the projected revenues made by SAT. While comparing the figures between Columns (3) and (4), they would highlight the areas in which efforts should be undertaken in specific taxes. For example, the focus on collecting individual income tax should be greater during the remainder of the year than on enterprise tax, VAT, and business Tax.

The following sections will describe the methodology and numerical examples which show how monthly tax receipts for each of the major taxes can be projected in China by using all the information up to the month in the assessment of the tax.

Table 3
Proportion of Total Revenues as of July 1999

Tax	MOF Target For Year (1)	Revenues: this Month (2)	Revenues: Year to date (3)	Projected Revenues: Remainder of the Year (4)	Projected Revenues: Total Year (5)
Import Duties	2.80%	2.81%	2.90%	2.95%	2.92%
Individual Income Tax	3.80%	3.62%	3.31%	3.83%	3.56%
Enterprise Income Tax	8.24%	5.62%	8.97%	8.55%	8.77%
VAT	38.40%	39.05%	44.92%	31.78%	38.67%
Business Tax	14.40%	16.67%	18.64%	12.15%	15.56%
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
Total	100.00%	100.00%	100.00%	100.00%	100.00%

5.3 Methodology for Monthly Tax Revenue Forecasting

During the fiscal year, the government continues to collect additional tax revenues and data from either advance installment payments or actual tax payments. Thus, in a given month, annual tax receipts for the fiscal year can be seen as the sum of two parts: one is actual revenues collected up to the month of the assessment, and the other is forecast revenues for the remainder of the year. The focus of this section is to project the second part of monthly revenues, taking the up-to-date tax collections into consideration.

There are two steps in developing a short-term revenue-forecasting model to estimate monthly receipts for a given tax. The first step is to calculate a weighted average of growth factors in annual tax revenues from two growth rates. The first growth rate is a comparison of this year's actual monthly tax collections up to the month of assessment with the corresponding months of the previous year. The second growth rate is this year's GDP growth rate expressed in current prices. The reason for using the GDP growth rates is that the tax bases for most of the taxes are likely to move in step with changes in GDP. Nevertheless, if another variable is considered to be a better proxy than GDP for the tax base in question, then it should be the one employed. For example, private consumption, rather than GDP, should be the one used to forecast VAT, provided that the data is available.

Regarding the respective weights, they would depend on the proportion of the number of months in which actual tax revenues were collected. Having all the above parameters, the weighted average growth factor can then be calculated.

While expressed in mathematical terms, the growth factor, (δ), can be measured by a weighted average of the growth rate of actual year-to-date monthly receipts in the current year ($\sum_j T_{j,t}$) to the same months of the previous year ($\sum_j T_{j,t-1}$) and the expected

GDP growth rate in current prices between the two years (GDP_{t-1} and GDP_t). The weights are the fraction of the number of months in a year during which the taxes were actually collected, (α), and the remaining fraction, ($1-\alpha$), respectively. That is,

$$\delta = \alpha \cdot [(\sum_j T_{j,t}) / (\sum_j T_{j,t-1}) - 1] + (1-\alpha) \cdot [(GDP_t / GDP_{t-1}) - 1] \quad (4)$$

where $[(\sum_j T_{j,t}) / (\sum_j T_{j,t-1}) - 1]$ represents the rate of increase of actual monthly receipts over the first j months of the year over the revenues of the previous year. At the same time, $[(GDP_t / GDP_{t-1}) - 1]$ represents the nominal GDP growth rate.

The weight (α) can be calculated by $j/12$, which varies from 0 (when no tax receipts data are available for any months in the current forecast year) to 1 (when tax receipts data are available for all of the months of the current forecast year).

The formula used to forecast the remaining monthly tax revenues from the corresponding monthly collections in the previous year can be expressed below:

$$T_{i,t}^* = T_{i,t-1} \cdot (1+\delta) \quad (5)$$

where $T_{i,t}^*$ and $T_{i,t-1}$ stand for the i th monthly tax receipts in the current (forecast) year and the previous year.

The second step is to account for the behavior response if there is a change in effective tax rates from the previous year. By taking into account the behavior response to changes in the tax rate between the current (forecast) and the previous years, one can build in the user-defined elasticity of the tax base with respect to changes in the tax rate.¹⁶ Therefore, the calculation of the tax receipts in a given month, i , of the current (forecast) year ($T_{i,t}^*$) is modified as follows:

$$T_{i,t}^* = T_{i,t-1} \cdot \{1 + \delta \cdot [\tau_{i,t} / \tau_{i,t-1}]^{1+\eta}\} \quad (6)$$

where $\tau_{i,t}$ stands for the effective tax rate applicable to the i th month in the t th year, and η is the user-defined elasticity of the tax base with respect to changes in the tax rate. It should be noted that the effective tax rate is defined as the ratio of tax revenues to the tax base.

Suppose that the effective tax rate is increased by 10% this year and that the elasticity is assumed to be small at -0.05 , then, other things being equal, the tax revenues would increase by only 9.48% as a result of the behavioral response.

The next section presents numerical examples for several taxes, import duties and the enterprise income tax.

¹⁶ See, e.g., William B. Trautman, "A Tax Receipts Monitoring and Forecasting Model for Transition Economies", Harvard Institute for International Development, Development Discussion Paper, (June 1999).

5.4 Examples: Monthly Projection of Tax Revenues

Two examples are presented in this section for illustrative purposes. The first one is import duties and the second is the enterprise income tax. In both cases, July 1999 is chosen for the reference month.

5.4.1 Import Duties

As of July 1999, we attempt to make the short term forecast for monthly import duties for the remainder of the year. A monthly tax receipt model should be developed. The model would not only supply data to build the summary monthly revenue statement, as outlined in the previous section, but would also help SAT or the Department of Customs to:

- Monitor Customs monthly revenue collection versus targets and the outstanding balance of revenue needed to be collected to meet the target;
- With the present collection effort and GDP growth rate, will Customs be in the position to meet the revenue targets? The figures provided by the model can help Customs to take necessary early action to reach the annual target.

Assume that the data on monthly import duties collected by Customs up to July 1999 are made available to the study team. These figures, which are not in bold, are presented in Panel A of Table 4. While projecting the monthly tax receipts, the model should take into account the following factors as discussed in the previous section:

Table 4
Actual, Forecasting and Monitoring Monthly Tax Collections at Customs
(100 million yuan)

A. Actual and Forecast Revenues

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	22.26	18.00	22.43	20.90	23.70	27.15	28.45	28.60	27.80	26.95	27.60	39.20
1999	23.15	18.70	21.25	20.50	30.00	27.75	29.50	30.06	29.22	28.33	29.01	41.20
2000	24.33	19.65	22.33	21.55	31.53	29.17						

B. MOF Target vs. Actual in 1999 (Target was set at an assumed 35,000 million yuans)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Actual:												
1999	23.15	18.70	21.25	20.50	30.00	27.75	29.50					
Outstanding Balance:												
1999	326.8	308.1	286.9	266.4	236.4	208.6	179.1					
MOF Target:												
1999	-	-	-	-	-	-		34.13	33.18	32.15	32.92	46.77

Note: The figures with bold are either forecast or estimated values.

- The trend of the actual monthly collection for fiscal year 1999. In this case, it was the first seven months of 1999. That is, $\alpha = 7/12$. The increase in the actual monthly tax collections between the current and the previous years equals 4.90% (i.e., $[(\sum_j T_{j,t}) / (\sum_j T_{j,t-1}) - 1]$).
- The trend of the monthly collection is influenced by the projected growth rate in imports, which would be a better proxy than GDP for the tax base. We can assume that this growth rate in 1999 is estimated at 6%, based on the forecast made by the Ministry of Finance.
- The growth factor for the monthly import duties from the previous year to the current year is estimated at 5.36%, according to equation (4). Thus, the forecast of the respective monthly tax revenues over the next year is obtained from the multiplication of the actual monthly collections in the prior year by the growth factor generated (i.e., equation (5)).
- From equation (6), one can see that the amount of tax receipts will also be influenced by changes in the effective tax rates and elasticity of the tax base with respect to changes in the tax rate. The effective tariff rate in 1998 is about 2.69%. For illustrative purposes, we assume that the effective tax rate from July 1999 is lowered by 5% from 1998 because of trade liberalization in China. The elasticity of the tax base with respect to the tax rate (η) is assumed at -0.05 . This implies that the growth factor (δ) derived earlier would be adjusted downward by 4.76%. That is,

$$\begin{aligned}
 & [\tau_{i,t} / \tau_{i,t-1}]^{1+\eta} - 1 \\
 &= (0.95)^{1-0.05} - 1 \\
 &= -4.76\%
 \end{aligned}$$

- The adjusted growth factor would become 5.11% (i.e., $5.36\% * (1 - 4.76\%)$). This growth factor multiplied by the actual monthly collection in the previous year generates the forecast revenues for the corresponding months of this year and next year - presented with bold in Panel A of Table 4.

Parameters used in this model are all summarized in Appendix D.

The empirical results are summarized in Table 4. Panel A presents the actual monthly collections of import duties in 1998 and the first seven months of 1999. The monthly forecast from August 1999 on is also presented, based on the methodology outlined above. The estimate of customs duties forecast for the whole year, 1999, is 32,867 million yuans. These figures are also presented in the summary table of the previous section (Row 1 of Table 2).

Panel B compares the actual collections with the target set by the Ministry of Finance. The target for the revenue collection for Customs is assumed to be set by the Ministry of Finance at 35,000 million yuans, which is also shown in Table 2. The outstanding balance as of August 1 is 17,915 million yuans. To achieve the target, Customs has to collect 3,413 million yuans in August, 3,318 million yuans in September, 3,215 million yuans in October, 3,292 million yuans in November and 4,677 million yuans in December.¹⁷ These estimated monthly targets are approximately 13.5% higher than the projections made by Customs itself.¹⁸

The model can be used as a monitoring tool to assess the actual performance against the target. This monitoring tool helps the policy makers to undertake early steps in administration in order to strengthen future collection.

5.4.2 Enterprise Income Tax

The monthly tax receipts can also be modeled for the enterprise income tax. For example, actual data collections for 7 months are assumed to be available, and they display much greater volatility from month to month than do import duties. In 1997, gross business profits accounted for approximately 37.8% of GDP.¹⁹ For the purpose of this exercise, we assume that 35% of GDP came from gross business profits in the reference year that would be an appropriate proxy for the tax base of the enterprise income tax. The enterprise income tax in 1998 is approximately 103,800 million yuans from state-owned, collective-owned and other enterprises.²⁰ The effective tax rate in 1998 then estimated at approximately 3.72 percent. Using the same methodology developed in Section 5.3 and the parameters specified in Appendix E, the forecast of the enterprise income taxes for the remaining months of 1999 is presented in Table 5.

It should be noted that in computing δ , the GDP nominal growth rate in 1999 should be used, since the growth rate of actual tax collections is expressed in current prices. The nominal GDP growth rate would be 16.1%, if the GDP real growth rate of 7.5% and the GDP deflator of 8% were forecast by the Ministry of Finance. Thus, δ is estimated at about 9.20% according to equation (4).

We can assume that the effective tax rate from July 1999 is raised by 3% relative to 1998, reflecting the removal of certain tax incentives and the elasticity of the tax base with respect to the tax rate (η), estimated at -0.05. This implies that the growth factor (δ) derived earlier would be adjusted upward by 2.85%. That is,

¹⁷ These revenues are based on the same pattern as 1998.

¹⁸ This is, for example, an increase from 3,006 million yuans to 3,413 million yuans in August.

¹⁹ See National Bureau of Statistics, Department of National Accounts, Input-Output Table of China, (China Statistics Press, September 1999). The percentage is higher than that in most developed countries, because China has a lower labor income.

²⁰ The source of data is SAT. Most of the income taxes are collected from State-owned and Collective-owned Enterprise. In 1998, they were 74,393 million yuans and 16,875 million yuans, respectively. Their sum accounts for 89.2% of the total enterprise income taxes.

$$\begin{aligned}
& [\tau_{i,t} / \tau_{i,t-1}]^{1+\eta} - 1 \\
& = (1.03)^{1-0.05} - 1 \\
& = +2.85\%
\end{aligned}$$

The adjusted growth factor would become 9.46% (i.e., 9.20%*(1+2.85%)). This growth factor multiplied by the actual monthly collection in the previous year generates the forecast revenues for the corresponding months of this year and the following year, presented with bold in Panel A of table 5.

The model estimates that an amount ranging from 53.9 million yuans to 173.8 million yuans of monthly enterprise income tax should be collected for the remaining five months (see Panel B of Table 5). These figures suggest that SAT has to raise, on average, 11.65% higher taxes for the remainder of the fiscal year in meeting the target set by the Ministry of Finance.

The monthly tax receipts can also be modeled for the individual income tax, VAT, business tax, etc.

Table 5
Actual, Forecasting and Monitoring Monthly Tax Collections
of Enterprise Income Tax by SAT
(100 million yuans)

A. Actual and Forecast

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1998	65.90	32.02	124.2	56.83	38.50	133.6	56.27	44.15	119.5	55.07	57.11	142.3
1999	69.00	33.00	131.0	57.00	40.00	140.0	59.00	48.33	130.8	60.28	62.51	155.7
2000	75.53	36.12	143.4	62.39	43.78	153.2	64.58					

B. MOF Target vs. Actual in 1999 (Target was set at an assumed 1,030 million yuans)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Actual:												
1999	69.00	33.00	131.0	57.00	40.00	140.0	59.00					
Outstanding Balance:												
1999	971.0	938.0	807.0	750.0	710.0	570.0	511.0					
MOF Target:												
1999	-	-	-	-	-	-	-	53.96	146.0	67.30	69.80	173.8

Note: The figures with bold are either forecast or estimated values.

5.5 Concluding Remarks

A monthly tax receipts forecasting model has been developed in this report. This model should be useful for the Ministry of Finance and the State Administration of

Taxation, especially as China moves toward a market economy. During this transitional period, the country's economy will undoubtedly undergo dynamic and structural changes. As a result, certain tax revenues may be more volatile than before. Therefore, the development of a monthly tax receipts model should prove useful in monitoring the movement of tax revenues.

VI. Conclusions

This report has presented a general approach for estimating tax capacity and for forecasting revenues for each tax in developed countries. The paper has also developed a comprehensive value-added tax simulation model that can be employed to assess the consequences of key policy decisions regarding the treatment of major commodities and sectors. The model can be used as an alternative to forecast VAT revenues for future years. A monthly short-term forecasting model was also developed in the report. The model should be useful for the purpose of monitoring each of the major tax revenues.

The main conclusions and recommendations are summarized below:

Tax Capacity

- Tax capacity is a difficult concept. In practice, the tax capacity of a country can be estimated by its comparison with other countries in terms of income per capita, ability to export in manufacturing and natural resource sectors and the relative importance of the agricultural sector in the economy.
- This model implies that a country's potential for raising tax revenues should be similar to that in other countries if their economic characteristics are similar. When the actual tax revenue is less than the estimated tax revenues as suggested above, it means that the government should be able to raise its tax revenues by improving compliance.

Macro-based Models

- The models identify the tax base for each tax and its relationship with other economic variables in the economy in determining the extent to which tax revenues can be generated. This approach has been used in most developed countries.
- The approach relies on national accounts, which contain variables that can be considered a good proxy for the tax in question. China does not appear to have a comprehensive list of economic variables available in national accounts because of its socialist economy in the past. In addition, revenue gains and losses for each tax due to discretionary policy changes are not estimated in each budget. These data are important for estimating tax elasticities for the purpose of revenue forecasting and should begin to be compiled and collected.

- At present, tax revenues do not seem to respond to changes in the tax base in quite the same way as they do in developed countries. This may be due to the fact that China is in a transitional stage from a planned economy to a market economy.

VAT Model

- A comprehensive VAT model has been developed for the Chinese economy. The model estimates the VAT tax base, including taxable goods and services purchased by households, governments and producers of tax-exempt commodities and services. The model also accounts for multiple tax rates in estimating potential tax revenues.
- The empirical results suggest that the overall compliance ratio of VAT is approximately 62%. The 38% non-compliance ratio is due to tax free allowances for small importers, small suppliers' exemptions, tax evasion, weak administration and inaccurate measurement of data. The compliance ratio is an important element for making a realistic forecast of tax revenues.
- The developed model can be used not only to forecast revenues in future years, but also to assess the revenue implications when the government contemplates changes in VAT policies.

Monthly Model

- A monthly tax receipts forecasting model has also been developed. The model accounts for actual revenues collected up to the month of assessment, forecast of the tax base or other economic indicators for the period, and behavioral response to changes in the tax base from the previous period. It is useful because it can monitor the movement of tax revenues against revenue targets set by the government, especially in China's transitional economy.
- Two examples have been presented in the report in order to demonstrate how monthly tax revenues can be forecast using the latest available information, and how they may be used as monitoring tools to assess the actual tax collections against targets.

Appendix A
Fiscal Decentralization in China

Type of Tax	Administration		Revenue Allocation	
	State Administration of Taxation	Local Tax Bureau	Central Government	Local Governments
Personal Income Tax	Interest from Financial Institutions		100%	
		Interest on Corporate Bonds and Other Personal Income		100%
Enterprise Income Tax	Centrally-owned State Enterprises		100%	
		Non-centrally-owned State Enterprises		100%
	Financial Institutions		100%	
		All the Others		100%
VAT	Taxable Goods and Services		75%	25%
Business Tax	Financial Institutions		3/8	5/8
		All Other Taxable Services		100%
Consumption Tax	Taxable Goods		100%	
Natural Resource Tax	Offshore-Oil		100%	
		All the Others		100%
Stamp Tax	Security Transaction		88%	12%
		All the Others		100%

Appendix B

Preliminary VAT Revenue Simulation (1998)

Content	Expenditures	Estimates of Expenditures	Taxable proportion	VAT Rate	Potential Tax Base	Expected VAT Revenue
	1997 (1)	1998 (2)	1998 (3)	1998 (4)	1998 (5)	1998 (6)
A PRIVATE CONSUMPTION:						
1 Crop Cultivation	46,712,645.60	49,482,705.48	0.00%	0.00%	-	-
2 Forestry	529,236.20	560,619.91	0.00%	0.00%	-	-
3 Livestock and Livestock Products	40,279,622.30	42,668,203.90	0.00%	0.00%	-	-
4 Fishery	11,374,075.00	12,048,557.65	0.00%	0.00%	-	-
5 Other Agricultural Products	4,713,630.70	4,993,149.00	0.00%	0.00%	-	-
6 Coal Mining and Processing	643,128.50	681,266.02	100.00%	13.00%	602,890.28	78,375.74
7 Crude Petroleum Products	-	-	100.00%	13.00%	-	-
8 Natural Gas Products	95,415.50	101,073.64	100.00%	13.00%	89,445.70	11,627.94
9 Ferrous Ore Mining	-	-	100.00%	17.00%	-	-
10 Non-Ferrous Ore Mining	-	-	100.00%	17.00%	-	-
11 Salt Mining	-	-	100.00%	17.00%	-	-
12 Non-Metal Minerals and Other Mining	175,992.70	186,429.07	100.00%	17.00%	159,341.08	27,087.98
13 Logging and Transport of Timber and Bamboo	-	-	100.00%	17.00%	-	-
14 Grain Mill Products, Vegetable Oil and Forage	14,925,624.90	15,810,714.46	100.00%	13.00%	13,991,782.70	1,818,931.75
15 Sugar Refining	1,015,661.90	1,075,890.65	100.00%	17.00%	919,564.66	156,325.99
16 Slaughtering, Meat Processing, eggs and Dairy Products	7,547,038.30	7,994,577.67	100.00%	17.00%	6,832,972.37	1,161,605.30
17 Prepared Fish and Seafood	3,748,381.20	3,970,660.21	100.00%	17.00%	3,393,726.67	576,933.53
18 Other Food Products	22,895,895.70	24,253,622.32	100.00%	17.00%	20,729,591.72	3,524,030.59
19 Wines, Spirits and Liquors	10,462,482.80	11,082,908.03	100.00%	17.00%	9,472,570.97	1,610,337.06
20 Non-Alcoholic Beverage	5,466,435.80	5,790,595.44	100.00%	17.00%	4,949,226.87	841,368.57
21 Tobacco Products	9,897,098.70	10,483,996.65	100.00%	17.00%	8,960,680.90	1,523,315.75
22 Cotton Textiles	2,567,559.60	2,719,815.88	100.00%	17.00%	2,324,628.96	395,186.92
23 Woolen Textiles	1,215,575.80	1,287,659.44	100.00%	17.00%	1,100,563.63	187,095.82
24 Hemp Textiles	98,709.30	104,562.76	100.00%	17.00%	89,369.88	15,192.88
25 Silk Textiles	804,617.20	852,331.00	100.00%	17.00%	728,488.03	123,842.97
26 Knitted Mills	2,099,546.30	2,224,049.40	100.00%	17.00%	1,900,896.92	323,152.48
27 Other Textiles	-	-	100.00%	17.00%	-	-
28 Wearing Apparel	17,103,750.20	18,118,002.59	100.00%	17.00%	15,485,472.30	2,632,530.29
29 Leather, Furs, Down and Related Products	6,707,451.10	7,105,202.95	100.00%	17.00%	6,072,823.03	1,032,379.92
30 Sawmills and Fibreboard	351,702.00	372,557.93	100.00%	17.00%	318,425.58	54,132.35
31 Furniture and Products of Wood, Bamboo, Cane, Palm, Straw, etc.	3,679,893.60	3,898,111.29	100.00%	17.00%	3,331,719.05	566,392.24
32 Paper and Products	750,899.50	795,427.84	100.00%	17.00%	679,852.86	115,574.99
33 Printing and Record Medium Reproduction	93,488.00	99,031.84	100.00%	13.00%	87,638.80	11,393.04
34 Cultural Goods	346,003.90	366,521.93	100.00%	13.00%	324,355.69	42,166.24
35 Toys, sporting and Athletic and Recreation Products	1,558,391.70	1,650,804.33	100.00%	17.00%	1,410,943.87	239,860.46
36 Petroleum Refining	502,317.20	532,104.61	100.00%	17.00%	454,790.26	77,314.35
37 Coking	-	-	100.00%	17.00%	-	-
38 Raw Chemical Materials	-	-	100.00%	17.00%	-	-
39 Chemical Fertilizers	-	-	100.00%	13.00%	-	-
40 Chemical Pesticides	-	-	100.00%	13.00%	-	-
41 Organic Chemical Products	100,614.90	106,581.36	100.00%	17.00%	91,095.18	15,486.18
42 Chemical Products for Daily Use	3,550,309.10	3,760,842.43	100.00%	17.00%	3,214,395.24	546,447.19
43 Other Chemical Products	-	-	100.00%	17.00%	-	-
44 Medical and Pharmaceutical Products	4,477,596.30	4,743,117.76	100.00%	17.00%	4,053,946.80	689,170.96
45 Chemical Fibers	-	-	100.00%	17.00%	-	-
46 Rubber Products	1,044,247.40	1,106,171.27	100.00%	17.00%	945,445.53	160,725.74
47 Plastic Products	1,155,052.60	1,223,547.22	100.00%	17.00%	1,045,766.85	177,780.37
48 Cement	507,385.10	537,473.04	100.00%	17.00%	459,378.66	78,094.37
49 Cement and Asbestos Products	462,706.80	490,145.31	100.00%	17.00%	418,927.62	71,217.70
50 Bricks, Tiles, Lime and Light-Weight Building Materials	3,329,502.30	3,526,941.79	100.00%	17.00%	3,014,480.16	512,461.63
51 Glass and Glass Products	404,310.20	428,285.79	100.00%	17.00%	366,056.23	62,229.56
52 Pottery, China and Earthenware	584,442.90	619,100.36	100.00%	17.00%	529,145.61	89,954.75
53 Fireproof Products	-	-	100.00%	17.00%	-	-
54 Other Non-Metallic Mineral Products	-	-	100.00%	17.00%	-	-
55 Iron-Smelting	-	-	100.00%	17.00%	-	-
56 Steel-Smelting	-	-	100.00%	17.00%	-	-
57 Steel Processing	132,661.70	140,528.54	100.00%	17.00%	120,109.86	20,418.68
58 Alloy Iron Smelting	-	-	100.00%	17.00%	-	-

59	Nonferrous Metal Smelting	-	-	100.00%	17.00%	-	-
60	Nonferrous Metal Processing	-	-	100.00%	17.00%	-	-
61	Metal Products	2,836,568.00	3,004,776.48	100.00%	17.00%	2,568,185.03	436,591.45
62	Boiler, engines and Turbine	-	-	100.00%	17.00%	-	-
63	Metalworking Machinery	-	-	100.00%	17.00%	-	-
64	Other General Industrial Machinery	-	-	100.00%	17.00%	-	-
65	Agriculture, Forestry, Animal Husbandry and Fishing Machinery	-	-	100.00%	13.00%	-	-
66	Other Special Industrial Equipment	476,875.90	505,154.64	100.00%	17.00%	431,756.10	73,398.54
67	Railroad Transport Equipment	-	-	100.00%	17.00%	-	-
68	Motor Vehicles	259,595.10	274,989.09	100.00%	17.00%	235,033.41	39,955.68
69	Ship Building	-	-	100.00%	17.00%	-	-
70	Aircraft	-	-	100.00%	17.00%	-	-
71	Bicycle	1,557,807.60	1,650,185.59	100.00%	17.00%	1,410,415.03	239,770.56
72	Other Transport Machinery	3,851,923.70	4,080,342.78	100.00%	17.00%	3,487,472.46	592,870.32
73	Generators	-	-	100.00%	17.00%	-	-
74	Household Electric Appliances	8,895,871.10	9,423,396.26	100.00%	17.00%	8,054,184.83	1,369,211.42
75	Other Electric Machinery and Equipment	594,218.10	629,455.23	100.00%	17.00%	537,995.93	91,459.31
76	Electric Computer	351,243.50	372,072.24	100.00%	17.00%	318,010.46	54,061.78
77	Electronic Appliances	5,268,867.10	5,581,310.92	100.00%	17.00%	4,770,351.21	810,959.71
78	Electronic Element and Device	-	-	100.00%	17.00%	-	-
79	Other Electronic and Communication	1,189,251.90	1,259,774.54	100.00%	17.00%	1,076,730.37	183,044.16
80	Instruments, Meters and Other Measuring Equipment	374,691.50	396,910.71	100.00%	17.00%	339,239.92	57,670.79
81	Cultural and Office Equipment	83,321.00	88,261.94	100.00%	17.00%	75,437.55	12,824.38
82	Maintenance and Repair of Machinery and Equipment	-	-	100.00%	17.00%	-	-
83	Arts and Crafts Products	3,816,723.00	4,043,054.67	100.00%	17.00%	3,455,602.29	587,452.39
84	Other Manufacturing Products	646,470.90	684,806.62	100.00%	17.00%	585,304.81	99,501.82
85	Scrap and Waste	-	-	100.00%	17.00%	-	-
86	Electricity Production and supply	4,076,029.80	4,317,738.37	100.00%	17.00%	3,690,374.67	627,363.69
87	Steam and Hot water Production and Supply	122,433.40	129,693.70	100.00%	17.00%	110,849.32	18,844.38
88	Gas Production and supply	782,239.60	828,626.41	100.00%	17.00%	708,227.70	120,398.71
89	Water Production and Supply	865,795.30	917,136.96	100.00%	13.00%	811,625.63	105,511.33
90	Construction and repairs	-	-	0.00%	0.00%	-	-
91	Railway Freight Transport	455,376.00	482,379.80	0.00%	0.00%	-	-
92	Highway Freight Transport	970,936.30	1,028,512.82	0.00%	0.00%	-	-
93	Pipeline Transport	4,830.20	5,116.63	0.00%	0.00%	-	-
94	Water Freight Transport	73,546.40	77,907.70	0.00%	0.00%	-	-
95	Air Freight Transport	63,410.90	67,171.17	0.00%	0.00%	-	-
96	Transportation not Elsewhere Classified and Auxiliary Body	248,341.20	263,067.83	0.00%	0.00%	-	-
97	Warehousing	-	-	0.00%	0.00%	-	-
98	Post	1,034,289.80	1,095,623.19	0.00%	0.00%	-	-
99	Telecommunication	2,305,982.10	2,442,726.84	0.00%	0.00%	-	-
100	Wholesale and Retail Trade	19,784,717.30	20,957,951.04	100.00%	17.00%	17,912,778.66	3,045,172.37
101	Eating and Drinking Places	9,842,694.60	10,426,366.39	0.00%	0.00%	-	-
102	Railway Passenger Transport	1,020,907.30	1,081,447.10	0.00%	0.00%	-	-
103	Highway Passenger Transport	2,737,844.00	2,900,198.15	0.00%	0.00%	-	-
104	Water Passenger Transport	510,159.10	540,411.53	0.00%	0.00%	-	-
105	Air Passenger Transport	111,020.70	117,604.23	0.00%	0.00%	-	-
106	Finance	8,756,835.40	9,276,115.74	0.00%	0.00%	-	-
107	Insurance	487,061.80	515,944.56	0.00%	0.00%	-	-
108	Real Estate	10,762,282.70	11,400,486.06	0.00%	0.00%	-	-
109	Public Services	1,397,813.50	1,480,703.84	0.00%	0.00%	-	-
110	Resident Services	5,341,638.00	5,658,397.13	50.00%	17.00%	2,418,118.43	411,080.13
111	Hotels	1,760,024.70	1,864,394.16	0.00%	0.00%	-	-
112	Tourism	2,238,094.00	2,370,812.97	0.00%	0.00%	-	-
113	Recreational Services	237,349.80	251,424.64	0.00%	0.00%	-	-
114	Other Social services	290,178.70	307,386.30	20.00%	17.00%	52,544.67	8,932.59
115	Health Services	8,510,357.00	9,015,021.17	0.00%	0.00%	-	-
116	Sports	44,680.20	47,329.74	0.00%	0.00%	-	-
117	Social Welfare	81,736.20	86,583.16	0.00%	0.00%	-	-
118	Educational Services	5,257,932.90	5,569,728.32	0.00%	0.00%	-	-
119	Cultural and arts, Radio, Film and Television	3,298,529.60	3,494,132.41	0.00%	0.00%	-	-
120	Scientific Research	-	-	0.00%	0.00%	-	-
121	General Technical Services	-	-	0.00%	0.00%	-	-
122	Technical Services for Agriculture, Forestry, Livestock and Fishing	-	-	0.00%	0.00%	-	-
123	Geological Prospecting and Water Conservancy	-	-	0.00%	0.00%	-	-
124	Public Administration and Other Sectors	-	-	0.00%	0.00%	-	-
	Sub-Total	357,789,597.40				171,720,749.04	28,556,217.78

B GOVERNMENT EXPENDITURE:

109	Public Services	6,235,287.90	6,778,381.48	38.87%	13%, 17%	2,255,099.88	379,692.86
110	Resident Services	36,042.30	39,181.58	48.48%	13%, 17%	16,263.39	2,733.36
115	Health Services	7,988,606.50	8,684,414.13	62.98%	13%, 17%	4,678,914.33	790,799.07
116	Sports	343,078.90	372,961.07	33.38%	13%, 17%	106,802.33	17,688.11
117	Social Welfare	806,630.80	876,888.34	33.35%	13%, 17%	253,108.37	41,041.32
118	Educational Services	15,455,459.70	16,801,630.24	32.01%	13%, 17%	4,630,175.75	747,793.72
119	Cultural and arts, Radio, Film and Television	1,887,545.80	2,051,951.04	28.41%	13%, 17%	501,867.02	81,056.77
120	Scientific Research	2,121,320.50	2,306,087.52	49.05%	13%, 17%	968,607.89	162,374.50
121	General Technical Services	3,293,824.10	3,580,716.18	20.28%	13%, 17%	623,105.06	102,971.01
122	Technical Services for Agriculture, Forestry, Livestock and Fishing	935,701.10	1,017,200.67	15.42%	13%, 17%	136,196.84	20,696.01
123	Geological Prospecting and Water Conservancy	3,234,311.10	3,516,019.60	26.05%	13%, 17%	784,119.00	131,932.68
124	Public Administration and Other Sectors	44,910,891.00	48,822,629.61	28.55%	13%, 17%	11,991,788.36	1,946,095.94
	Sub-Total	87,248,699.70				26,946,048.22	4,424,875.36

C TAX BASE ASSOCIATED WITH THE EXEMPT ACTIVITIES:

1	Crop Cultivation	44,900,785.60	46,126,577.05	58.93%	13%, 17%	23,821,179.48	3,361,212.37
2	Forestry	2,204,867.10	2,265,059.97	41.39%	13%, 17%	814,967.58	122,940.83
3	Livestock and Livestock Products	38,419,927.30	39,468,791.32	42.72%	13%, 17%	14,816,723.38	2,048,291.15
4	Fishery	9,006,706.70	9,252,589.79	58.97%	13%, 17%	4,746,443.49	710,733.97
5	Other Agricultural Products	4,825,701.40	4,957,443.05	38.61%	13%, 17%	1,641,865.69	272,203.07
90	Construction and repairs	123,880,171.60	135,524,907.73	88.64%	13%, 17%	59,783,551.78	10,155,432.11
91	Railway Freight Transport	3,124,946.40	3,542,439.24	90.93%	13%, 17%	2,759,413.07	461,726.93
92	Highway Freight Transport	7,423,696.80	8,415,502.69	73.16%	13%, 17%	5,266,331.33	890,450.44
93	Pipeline Transport	191,296.60	216,853.83	81.68%	13%, 17%	151,469.96	25,656.24
94	Water Freight Transport	1,381,587.80	1,566,167.93	75.40%	13%, 17%	1,009,554.62	171,336.00
95	Air Freight Transport	568,773.10	644,761.19	64.83%	13%, 17%	357,423.79	60,574.89
96	Transportation not Elsewhere Classified and Auxiliary Body	2,919,032.30	3,309,015.02	61.75%	13%, 17%	1,750,078.75	293,238.02
97	Warehousing	507,502.10	575,304.38	51.78%	13%, 17%	259,581.46	38,253.62
98	Post	1,171,124.40	1,327,586.62	81.86%	13%, 17%	940,464.73	146,297.68
99	Telecommunication	7,160,595.50	8,117,251.06	81.42%	13%, 17%	5,655,503.27	953,562.54
101	Eating and Drinking Places	14,490,547.70	16,426,484.87	59.41%	13%, 17%	8,374,947.83	1,384,026.83
102	Railway Passenger Transport	1,280,522.80	1,428,928.65	89.57%	13%, 17%	1,095,496.83	184,251.66
103	Highway Passenger Transport	1,528,172.20	1,732,336.01	72.78%	13%, 17%	1,078,581.93	182,212.21
104	Water Passenger Transport	1,462,826.20	1,658,259.78	73.79%	13%, 17%	1,046,213.79	177,416.10
105	Air Passenger Transport	2,317,215.40	2,626,795.38	69.63%	13%, 17%	1,564,116.48	265,183.82
106	Finance	11,721,144.80	13,287,089.75	34.79%	13%, 17%	3,969,092.19	653,486.33
107	Insurance	2,286,559.50	2,592,043.85	33.53%	13%, 17%	749,183.21	119,929.09
108	Real Estate	4,470,179.70	5,067,395.71	62.03%	13%, 17%	2,693,393.07	449,912.49
109	Public Services	5,602,828.00	6,351,365.82	77.17%	13%, 17%	1,939,928.97	326,627.30
110	Resident Services	3,651,132.35	4,138,923.63	84.97%	13%, 17%	2,994,557.02	503,289.64
111	Hotels	3,030,001.20	3,434,809.36	69.97%	13%, 17%	2,059,817.84	343,518.27
112	Tourism	3,122,594.90	3,539,773.58	3.63%	13%, 17%	110,016.52	18,477.26
113	Recreational Services	1,409,441.90	1,597,743.34	70.44%	13%, 17%	963,982.69	161,467.72
114	Other Social services	10,846,081.68	12,295,118.19	76.86%	13%, 17%	8,111,411.52	1,341,075.35
115	Health Services	11,481,920.70	13,015,905.31	93.52%	13%, 17%	5,734,804.24	969,258.58
116	Sports	181,883.10	206,182.68	70.39%	13%, 17%	17,708.71	2,932.84
117	Social Welfare	485,731.80	550,625.57	63.98%	13%, 17%	50,028.48	8,112.08
118	Educational Services	10,568,205.00	11,980,117.19	69.69%	13%, 17%	2,557,867.38	413,106.82
119	Cultural and arts, Radio, Film and Television	3,657,434.30	4,146,067.52	55.55%	13%, 17%	1,481,016.98	239,199.74
120	Scientific Research	1,699,707.00	1,926,787.86	80.11%	13%, 17%	353,335.30	59,232.06
121	General Technical Services	2,112,728.00	2,394,988.46	51.98%	13%, 17%	445,257.98	73,580.96
122	Technical Services for Agriculture, Forestry, Livestock and Fishing	1,778,921.90	2,016,585.87	31.21%	13%, 17%	410,157.46	62,326.15
123	Geological Prospecting and Water Conservancy	2,403,604.10	2,724,725.61	59.98%	13%, 17%	615,028.93	103,482.27
124	Public Administration and Other Sectors	24,339,302.60	27,591,033.43	52.00%	13%, 17%	352,282.64	57,170.44
125	Special Tax Credits on:						
	(1) Purchase of Agricultural Products	134,122,054.20	139,419,875.34	64.84%	10.00%	90,406,700.76	(9,040,670.08)
	(2) Freight Charges	30,778,983.60	31,994,753.45	77.35%	7.00%	24,746,602.49	(1,732,262.17)
	Sub-Total	373,595,401.53					17,038,253.63

D TAX BASE ASSOCIATED WITH ITC'S DENIED TO PURCHASES OF FIXED ASSETS:

2	Forestry	1,585,650.70	1,776,404.48	0.00%	0.00%	-	-
3	Livestock and Livestock Products	4,352,229.40	4,875,802.60	0.00%	0.00%	-	-
31	Furniture and Products of Wood, Bamboo, cane, Palm, Straw, etc.	1,115,415.30	1,249,599.76	100.00%	17.00%	1,068,033.98	181,565.78
61	Metal Products	1,703,364.80	1,908,279.59	100.00%	17.00%	1,631,008.19	277,271.39
62	Boiler, Engines and Turbine	3,849,499.00	4,312,593.73	100.00%	17.00%	3,685,977.55	626,616.18
63	Metalworking Machinery	3,513,034.80	3,935,652.89	100.00%	17.00%	3,363,805.89	571,847.00

64	Other General Industrial Machinery	6,953,284.40	7,789,764.51	100.00%	17.00%	6,657,918.39	1,131,846.13
65	Agriculture, Forestry, Animal Husbandry and Fishing Machinery	5,492,784.80	6,153,566.81	100.00%	13.00%	5,445,634.35	707,932.47
66	Other Special Industrial Equipment	18,270,246.90	20,468,157.60	100.00%	17.00%	17,494,151.80	2,974,005.81
67	Railroad Transport Equipment	1,386,951.90	1,553,802.21	100.00%	17.00%	1,328,036.08	225,766.13
68	Motor Vehicles	7,703,247.30	8,629,947.95	100.00%	17.00%	7,376,023.89	1,253,924.06
69	Ship Building	1,343,859.50	1,505,525.80	100.00%	17.00%	1,286,774.19	218,751.61
70	Aircraft	2,520,923.70	2,824,190.82	100.00%	17.00%	2,413,838.31	410,352.51
72	Other Transport Machinery	4,142,254.50	4,640,567.72	100.00%	17.00%	3,966,297.19	674,270.52
73	Generators	1,371,476.80	1,536,465.46	100.00%	17.00%	1,313,218.34	223,247.12
74	Household Electric Appliances	1,090,452.30	1,221,633.71	100.00%	17.00%	1,044,131.38	177,502.33
75	Other Electric Machinery and Equipment	2,592,206.80	2,904,049.28	100.00%	17.00%	2,482,093.40	421,955.88
76	Electronic Computer	822,129.20	921,031.34	100.00%	17.00%	787,206.28	133,825.07
77	Electronic Appliances	463,843.10	519,643.42	100.00%	17.00%	444,139.68	75,503.75
79	Other Electronic and Communication	6,138,536.40	6,877,002.33	100.00%	17.00%	5,877,779.77	999,222.56
80	Instruments, Meters and Other Measuring Equipment	955,039.30	1,069,930.53	100.00%	17.00%	914,470.54	155,459.99
81	Cultural and Office Equipment	128,192.40	143,613.95	100.00%	17.00%	122,746.96	20,866.98
83	Arts and Crafts Products	855,064.90	957,929.21	100.00%	17.00%	818,742.91	139,186.30
90	Construction	167,473,027.90	187,620,033.16	0.00%	0.00%	-	-
91	Railway Freight Transport	174,497.00	195,488.99	0.00%	0.00%	-	-
92	Highway Freight Transport	258,197.80	289,259.00	0.00%	0.00%	-	-
94	Water Freight Transport	25,122.80	28,145.07	0.00%	0.00%	-	-
95	Air Freight Transport	52,211.90	58,492.99	0.00%	0.00%	-	-
96	Transportation not elsewhere Classified and Auxiliary Body	73,551.20	82,399.41	0.00%	0.00%	-	-
100	Wholesale and retail Trade	3,267,002.90	3,660,023.35	80.00%	17.00%	2,502,580.07	425,438.61
108	Real Estate	1,868,700.00	2,093,504.61	0.00%	0.00%	-	-
	Sub-Total	251,541,999.70				72,024,609.12	12,026,358.18

E SUMMARY:

Private Consumption	171,720,749.04	28,556,217.78
Government Expenditures	26,946,048.22	4,424,875.36
Intermediate Purchases Denied ITCs	-	17,038,253.63
Fixed Asset Denied ITCs	72,024,609.12	12,026,358.18
Total	270,691,406.38	62,045,704.95

Compliance Rate 62.37%

Notes: Column (1) refers to gross expenditures by various entities, households, governments and businesses in 1997.
Column (2) shows the estimates of 1998 gross expenditures by using sectoral growth rates estimated by National Bureau of Statistics, P.R. China.
Column (3) shows the portion of expenditures subject to VAT. The percentages shown under the category of governments were estimated from the corresponding sectors in the intermediate use matrix of the 1997 Input-Output Table of China. For the tax base associated with the exempt activities, the figures were calculated as the percentage the total intermediates that were subject to VAT.
Column (4) denotes the VAT rate for the commodity category. For exempt output commodities, various intermediate inputs may be subject to different VAT rates.
Column (5) is the tax base exclusive of VAT in which the expenditures may be subject to either 13% or 17%.
Column (6) is the potential VAT revenue by ignoring bad debt allowances, tax free allowances for small importation, lower tax refunds to exporters, tax evasion, small suppliers exemption, and weak tax administration.

Sources: National Bureau of Statistics, Input-Output Table of China, 1997 (China Statistics Press, September 1999); and China Statistical Yearbook, 1998.

Appendix C

Preliminary VAT Revenue under the Proposed Tax System (1998)

Content	Expenditures	Estimates of Expenditures	Taxable proportion	VAT Rate	Potential Tax Base	Expected VAT Revenue
	1997 (1)	1998 (2)	1998 (3)	1998 (4)	1998 (5)	1998 (6)
A PRIVATE CONSUMPTION:						
1 Crop Cultivation	46,712,645.60	49,482,705.48	0.00%	0.00%	-	-
2 Forestry	529,236.20	560,619.91	0.00%	0.00%	-	-
3 Livestock and Livestock Products	40,279,622.30	42,668,203.90	0.00%	0.00%	-	-
4 Fishery	11,374,075.00	12,048,557.65	0.00%	0.00%	-	-
5 Other Agricultural Products	4,713,630.70	4,993,149.00	0.00%	0.00%	-	-
6 Coal Mining and Processing	643,128.50	681,266.02	100.00%	13.00%	602,890.28	78,375.74
7 Crude Petroleum Products	-	-	100.00%	13.00%	-	-
8 Natural Gas Products	95,415.50	101,073.64	100.00%	13.00%	89,445.70	11,627.94
9 Ferrous Ore Mining	-	-	100.00%	17.00%	-	-
10 Non-Ferrous Ore Mining	-	-	100.00%	17.00%	-	-
11 Salt Mining	-	-	100.00%	17.00%	-	-
12 Non-Metal Minerals and Other Mining	175,992.70	186,429.07	100.00%	17.00%	159,341.08	27,087.98
13 Logging and Transport of Timber and Bamboo	-	-	100.00%	17.00%	-	-
14 Grain Mill Products, Vegetable Oil and Forage	14,925,624.90	15,810,714.46	100.00%	13.00%	13,991,782.70	1,818,931.75
15 Sugar Refining	1,015,661.90	1,075,890.65	100.00%	17.00%	919,564.66	156,325.99
16 Slaughtering, Meat Processing, eggs and Dairy Products	7,547,038.30	7,994,577.67	100.00%	17.00%	6,832,972.37	1,161,605.30
17 Prepared Fish and Seafood	3,748,381.20	3,970,660.21	100.00%	17.00%	3,393,726.67	576,933.53
18 Other Food Products	22,895,895.70	24,253,622.32	100.00%	17.00%	20,729,591.72	3,524,030.59
19 Wines, Spirits and Liquors	10,462,482.80	11,082,908.03	100.00%	17.00%	9,472,570.97	1,610,337.06
20 Non-Alcoholic Beverage	5,466,435.80	5,790,595.44	100.00%	17.00%	4,949,226.87	841,368.57
21 Tobacco Products	9,897,098.70	10,463,996.65	100.00%	17.00%	8,960,680.90	1,523,315.75
22 Cotton Textiles	2,567,559.60	2,719,815.88	100.00%	17.00%	2,324,628.96	395,186.92
23 Woolen Textiles	1,215,575.80	1,287,659.44	100.00%	17.00%	1,100,563.63	187,095.82
24 Hemp Textiles	98,709.30	104,562.76	100.00%	17.00%	89,369.88	15,192.88
25 Silk Textiles	804,617.20	852,331.00	100.00%	17.00%	728,488.03	123,842.97
26 Knitted Mills	2,099,546.30	2,224,049.40	100.00%	17.00%	1,900,896.92	323,152.48
27 Other Textiles	-	-	100.00%	17.00%	-	-
28 Wearing Apparel	17,103,750.20	18,118,002.59	100.00%	17.00%	15,485,472.30	2,632,530.29
29 Leather, Furs, Down and Related Products	6,707,451.10	7,105,202.95	100.00%	17.00%	6,072,823.03	1,032,379.92
30 Sawmills and Fibreboard	351,702.00	372,557.93	100.00%	17.00%	318,425.58	54,132.35
31 Furniture and Products of Wood, Bamboo, Cane, Palm, Straw, etc.	3,679,893.60	3,898,111.29	100.00%	17.00%	3,331,719.05	566,392.24
32 Paper and Products	750,899.50	795,427.84	100.00%	17.00%	679,852.86	115,574.99
33 Printing and Record Medium Reproduction	93,488.00	99,031.84	100.00%	13.00%	87,638.80	11,393.04
34 Cultural Goods	346,003.90	366,521.93	100.00%	13.00%	324,355.69	42,166.24
35 Toys, sporting and Athletic and Recreation Products	1,558,391.70	1,650,804.33	100.00%	17.00%	1,410,943.87	239,860.46
36 Petroleum Refining	502,317.20	532,104.61	100.00%	17.00%	454,790.26	77,314.35
37 Coking	-	-	100.00%	17.00%	-	-
38 Raw Chemical Materials	-	-	100.00%	17.00%	-	-
39 Chemical Fertilizers	-	-	100.00%	13.00%	-	-
40 Chemical Pesticides	-	-	100.00%	13.00%	-	-
41 Organic Chemical Products	100,614.90	106,581.36	100.00%	17.00%	91,095.18	15,486.18
42 Chemical Products for Daily Use	3,550,309.10	3,760,842.43	100.00%	17.00%	3,214,395.24	546,447.19
43 Other Chemical Products	-	-	100.00%	17.00%	-	-
44 Medical and Pharmaceutical Products	4,477,596.30	4,743,117.76	100.00%	17.00%	4,053,946.80	689,170.96
45 Chemical Fibers	-	-	100.00%	17.00%	-	-
46 Rubber Products	1,044,247.40	1,108,171.27	100.00%	17.00%	945,445.53	160,725.74
47 Plastic Products	1,155,052.60	1,223,547.22	100.00%	17.00%	1,045,766.85	177,780.37
48 Cement	507,385.10	537,473.04	100.00%	17.00%	459,378.66	78,094.37
49 Cement and Asbestos Products	462,706.80	490,145.31	100.00%	17.00%	418,927.62	71,217.70
50 Bricks, Tiles, Lime and Light-Weight Building Materials	3,329,502.30	3,528,941.79	100.00%	17.00%	3,014,480.16	512,461.63
51 Glass and Glass Products	404,310.20	428,285.79	100.00%	17.00%	366,056.23	62,229.56
52 Pottery, China and Earthenware	584,442.90	619,100.36	100.00%	17.00%	529,145.61	89,954.75
53 Fireproof Products	-	-	100.00%	17.00%	-	-
54 Other Non-Metallic Mineral Products	-	-	100.00%	17.00%	-	-
55 Iron-Smelting	-	-	100.00%	17.00%	-	-
56 Steel-Smelting	-	-	100.00%	17.00%	-	-
57 Steel Processing	132,661.70	140,528.54	100.00%	17.00%	120,109.86	20,418.68
58 Alloy Iron Smelting	-	-	100.00%	17.00%	-	-
59 Nonferrous Metal Smelting	-	-	100.00%	17.00%	-	-
60 Nonferrous Metal Processing	-	-	100.00%	17.00%	-	-
61 Metal Products	2,836,568.00	3,004,776.48	100.00%	17.00%	2,568,185.03	436,591.45
62 Boiler, engines and Turbine	-	-	100.00%	17.00%	-	-
63 Metalworking Machinery	-	-	100.00%	17.00%	-	-
64 Other General Industrial Machinery	-	-	100.00%	17.00%	-	-
65 Agriculture, Forestry, Animal Husbandry and Fishing Machinery	-	-	100.00%	13.00%	-	-
66 Other Special Industrial Equipment	476,875.90	505,154.64	100.00%	17.00%	431,756.10	73,398.54
67 Railroad Transport Equipment	-	-	100.00%	17.00%	-	-
68 Motor Vehicles	259,595.10	274,989.09	100.00%	17.00%	235,033.41	39,955.68
69 Ship Building	-	-	100.00%	17.00%	-	-
70 Aircraft	-	-	100.00%	17.00%	-	-
71 Bicycle	1,557,807.60	1,650,185.59	100.00%	17.00%	1,410,415.03	239,770.56
72 Other Transport Machinery	3,851,923.70	4,080,342.78	100.00%	17.00%	3,487,472.46	592,870.32
73 Generators	-	-	100.00%	17.00%	-	-
74 Household Electric Appliances	8,895,871.10	9,423,396.26	100.00%	17.00%	8,054,184.83	1,369,211.42
75 Other Electric Machinery and Equipment	594,218.10	629,455.23	100.00%	17.00%	537,995.93	91,459.31
76 Electric Computer	351,243.50	372,072.24	100.00%	17.00%	318,010.46	54,061.78
77 Electronic Appliances	5,268,867.10	5,581,310.92	100.00%	17.00%	4,770,351.21	810,959.71

78	Electronic Element and Device	-	-	100.00%	17.00%	-	-
79	Other Electronic and Communication	1,189,251.90	1,259,774.54	100.00%	17.00%	1,076,730.37	183,044.16
80	Instruments, Meters and Other Measuring Equipment	374,691.50	396,910.71	100.00%	17.00%	339,239.92	57,670.79
81	Cultural and Office Equipment	83,321.00	88,261.94	100.00%	17.00%	75,437.55	12,824.38
82	Maintenance and Repair of Machinery and Equipment	-	-	100.00%	17.00%	-	-
83	Arts and Crafts Products	3,816,723.00	4,043,054.67	100.00%	17.00%	3,455,602.29	587,452.39
84	Other Manufacturing Products	646,470.90	684,806.62	100.00%	17.00%	585,304.81	99,501.82
85	Scrap and Waste	-	-	100.00%	17.00%	-	-
86	Electricity Production and supply	4,076,029.80	4,317,738.37	100.00%	17.00%	3,690,374.67	627,363.69
87	Steam and Hot water Production and Supply	122,433.40	129,693.70	100.00%	17.00%	110,849.32	18,844.38
88	Gas Production and supply	782,239.60	828,626.41	100.00%	17.00%	708,227.70	120,398.71
89	Water Production and Supply	865,795.30	917,136.96	100.00%	13.00%	811,625.63	105,511.33
90	Construction and repairs	-	-	0.00%	0.00%	-	-
91	Railway Freight Transport	455,376.00	482,379.80	0.00%	0.00%	-	-
92	Highway Freight Transport	970,936.30	1,028,512.82	0.00%	0.00%	-	-
93	Pipeline Transport	4,830.20	5,116.63	0.00%	0.00%	-	-
94	Water Freight Transport	73,546.40	77,907.70	0.00%	0.00%	-	-
95	Air Freight Transport	63,410.90	67,171.17	0.00%	0.00%	-	-
96	Transportation not Elsewhere Classified and Auxiliary Body	248,341.20	263,067.83	0.00%	0.00%	-	-
97	Warehousing	-	-	0.00%	0.00%	-	-
98	Post	1,034,289.80	1,095,623.19	0.00%	0.00%	-	-
99	Telecommunication	2,305,982.10	2,442,726.84	100.00%	17.00%	2,442,726.84	415,263.56
100	Wholesale and Retail Trade	19,784,717.30	20,957,951.04	100.00%	17.00%	17,912,778.66	3,045,172.37
101	Eating and Drinking Places	9,842,694.60	10,426,366.39	0.00%	0.00%	-	-
102	Railway Passenger Transport	1,020,907.30	1,081,447.10	0.00%	0.00%	-	-
103	Highway Passenger Transport	2,737,844.00	2,900,198.15	0.00%	0.00%	-	-
104	Water Passenger Transport	510,159.10	540,411.53	0.00%	0.00%	-	-
105	Air Passenger Transport	111,020.70	117,604.23	0.00%	0.00%	-	-
106	Finance	8,756,835.40	9,276,115.74	0.00%	0.00%	-	-
107	Insurance	487,061.80	515,944.56	0.00%	0.00%	-	-
108	Real Estate	10,762,282.70	11,400,486.06	0.00%	0.00%	-	-
109	Public Services	1,397,813.50	1,480,703.84	0.00%	0.00%	-	-
110	Resident Services	5,341,638.00	5,658,397.13	50.00%	17.00%	2,418,118.43	411,080.13
111	Hotels	1,760,024.70	1,864,394.16	0.00%	0.00%	-	-
112	Tourism	2,238,094.00	2,370,812.97	0.00%	0.00%	-	-
113	Recreational Services	237,349.80	251,424.64	0.00%	0.00%	-	-
114	Other Social services	290,178.70	307,386.30	20.00%	17.00%	52,544.67	8,932.59
115	Health Services	8,510,357.00	9,015,021.17	0.00%	0.00%	-	-
116	Sports	44,680.20	47,329.74	0.00%	0.00%	-	-
117	Social Welfare	81,736.20	86,583.16	0.00%	0.00%	-	-
118	Educational Services	5,257,932.90	5,569,728.32	0.00%	0.00%	-	-
119	Cultural and arts, Radio, Film and Television	3,298,529.60	3,494,132.41	0.00%	0.00%	-	-
120	Scientific Research	-	-	0.00%	0.00%	-	-
121	General Technical Services	-	-	0.00%	0.00%	-	-
122	Technical Services for Agriculture, Forestry, Livestock and Fishing	-	-	0.00%	0.00%	-	-
123	Geological Prospecting and Water Conservancy	-	-	0.00%	0.00%	-	-
124	Public Administration and Other Sectors	-	-	0.00%	0.00%	-	-
	Sub-Total	357,789,597.40	-	-	-	174,163,475.88	28,971,481.35

B GOVERNMENT EXPENDITURE:

109	Public Services	6,235,287.90	6,778,381.48	39.96%	13%, 17%	2,255,099.88	385,695.56
110	Resident Services	36,042.30	39,181.58	65.82%	13%, 17%	16,263.39	2,747.33
115	Health Services	7,988,606.50	8,684,414.13	64.34%	13%, 17%	4,678,914.33	798,871.43
116	Sports	343,078.90	372,961.07	34.66%	13%, 17%	108,802.33	18,307.42
117	Social Welfare	806,630.80	876,888.34	35.26%	13%, 17%	253,108.37	42,824.92
118	Educational Services	15,455,459.70	16,801,630.24	32.20%	13%, 17%	4,630,175.75	750,821.16
119	Cultural and arts, Radio, Film and Television	1,887,545.80	2,051,951.04	46.61%	13%, 17%	501,867.02	95,389.16
120	Scientific Research	2,121,320.50	2,306,087.52	50.06%	13%, 17%	968,607.89	164,979.67
121	General Technical Services	3,293,824.10	3,580,716.18	22.51%	13%, 17%	623,105.06	110,034.00
122	Technical Services for Agriculture, Forestry, Livestock and Fishing	935,701.10	1,017,200.67	17.87%	13%, 17%	136,196.84	21,638.25
123	Geological Prospecting and Water Conservancy	3,234,311.10	3,516,019.60	27.35%	13%, 17%	784,119.00	135,793.27
124	Public Administration and Other Sectors	44,910,891.00	48,822,629.61	32.31%	13%, 17%	11,991,788.36	2,216,766.72
	Sub-Total	87,248,699.70	-	-	-	26,946,048.22	4,743,868.88

C TAX BASE ASSOCIATED WITH THE EXEMPT ACTIVITIES:

1	Crop Cultivation	44,900,785.60	46,126,577.05	59.01%	13%, 17%	23,821,179.48	3,366,574.10
2	Forestry	2,204,867.10	2,265,059.97	41.65%	13%, 17%	814,967.58	123,796.52
3	Livestock and Livestock Products	38,419,927.30	39,468,791.32	42.77%	13%, 17%	14,816,723.38	2,051,158.54
4	Fishery	9,006,706.70	9,252,589.79	59.13%	13%, 17%	4,746,443.49	712,750.56
5	Other Agricultural Products	4,825,701.40	4,957,443.05	38.67%	13%, 17%	1,641,885.69	272,635.26
90	Construction and repairs	123,880,171.60	135,524,907.73	88.59%	13%, 17%	59,783,551.78	10,460,258.90
91	Railway Freight Transport	3,124,946.40	3,542,439.24	91.17%	13%, 17%	2,759,413.07	462,962.24
92	Highway Freight Transport	7,423,696.80	8,415,502.69	74.86%	13%, 17%	5,266,331.33	911,359.73
93	Pipeline Transport	191,296.60	216,853.83	82.17%	13%, 17%	151,469.96	25,810.64
94	Water Freight Transport	1,381,587.80	1,566,167.93	76.44%	13%, 17%	1,009,554.62	173,702.65
95	Air Freight Transport	568,773.10	644,761.19	65.38%	13%, 17%	357,423.79	61,090.15
96	Transportation not Elsewhere Classified and Auxiliary Body	2,919,032.30	3,309,015.02	64.06%	13%, 17%	1,750,078.75	304,344.43
97	Warehousing	507,502.10	575,304.38	52.68%	13%, 17%	259,581.46	39,014.30
98	Post	1,171,124.40	1,327,586.62	82.72%	13%, 17%	940,464.73	147,956.59
99	Telecommunication	7,160,595.50	8,117,251.06	81.42%	13%, 17%	5,655,503.27	-
101	Eating and Drinking Places	14,490,547.70	16,426,484.87	59.68%	13%, 17%	8,374,947.83	1,390,471.07
102	Railway Passenger Transport	1,260,522.80	1,428,928.65	89.88%	13%, 17%	1,095,496.83	184,916.06
103	Highway Passenger Transport	1,528,172.20	1,732,336.01	74.69%	13%, 17%	1,078,581.93	187,019.82
104	Water Passenger Transport	1,462,826.20	1,658,259.78	74.27%	13%, 17%	1,046,213.79	178,572.63
105	Air Passenger Transport	2,317,215.40	2,626,795.38	70.16%	13%, 17%	1,564,116.48	267,168.51
106	Finance	11,721,144.80	13,287,089.75	38.05%	13%, 17%	3,969,092.19	716,423.98

107	Insurance	2,286,559.50	2,592,043.85	37.29%	13%, 17%	749,183.21	134,090.07
108	Real Estate	4,470,179.70	5,067,395.71	63.11%	13%, 17%	2,693,393.07	457,790.77
109	Public Services	5,602,828.00	6,351,365.82	78.38%	13%, 17%	1,939,928.97	331,791.06
110	Resident Services	3,651,132.35	4,138,923.63	85.05%	13%, 17%	2,994,557.02	505,861.62
111	Hotels	3,030,001.20	3,434,809.36	73.31%	13%, 17%	2,059,817.84	360,187.37
112	Tourism	3,122,594.90	3,539,773.58	4.76%	13%, 17%	110,016.52	24,289.15
113	Recreational Services	1,409,441.90	1,597,743.34	71.34%	13%, 17%	963,982.69	163,533.86
114	Other Social services	10,846,081.68	12,295,118.19	78.11%	13%, 17%	8,111,411.52	1,363,048.93
115	Health Services	11,481,920.70	13,015,905.31	94.47%	13%, 17%	5,734,804.24	979,152.63
116	Sports	181,883.10	206,182.68	72.80%	13%, 17%	17,708.71	3,035.52
117	Social Welfare	485,731.80	550,625.57	66.65%	13%, 17%	50,028.48	8,464.62
118	Educational Services	10,568,205.00	11,980,117.19	69.97%	13%, 17%	2,557,867.38	414,779.28
119	Cultural and arts, Radio, Film and Television	3,657,434.30	4,146,067.52	64.94%	13%, 17%	1,481,016.98	281,494.83
120	Scientific Research	1,699,707.00	1,926,787.86	81.37%	13%, 17%	353,335.30	60,182.39
121	General Technical Services	2,112,728.00	2,394,988.46	55.46%	13%, 17%	445,257.98	78,628.02
122	Technical Services for Agriculture, Forestry, Livestock and Fishing	1,778,921.90	2,016,585.87	32.50%	13%, 17%	410,157.46	65,163.71
123	Geological Prospecting and Water Conservancy	2,403,604.10	2,724,725.61	61.72%	13%, 17%	615,028.93	106,510.35
124	Public Administration and Other Sectors	24,339,302.60	27,591,033.43	58.95%	13%, 17%	352,282.64	65,121.93
125	Special Tax Credits on:						
	(1) Purchase of Agricultural Products	134,122,054.20	139,419,875.34	64.84%	10.00%	90,406,700.76	(9,040,670.08)
	(2) Freight Charges when Goods are Purchased	30,778,983.60	31,994,753.45	77.35%	7.00%	24,746,602.49	(1,732,262.17)
	Sub-Total	373,595,401.53					16,668,180.53

D TAX BASE ASSOCIATED WITH ITC'S DENIED TO PURCHASES OF FIXED ASSETS:

2	Forestry	1,585,650.70	1,776,404.48	0.00%	0.00%	-	-
3	Livestock and Livestock Products	4,352,229.40	4,875,802.60	0.00%	0.00%	-	-
31	Furniture and Products of Wood, Bamboo, cane, Palm, Straw, etc.	1,115,415.30	1,249,599.76	100.00%	17.00%	1,068,033.98	181,565.78
61	Metal Products	1,703,364.80	1,908,279.59	100.00%	17.00%	1,631,008.19	277,271.39
62	Boiler, Engines and Turbine	3,849,499.00	4,312,593.73	100.00%	17.00%	3,685,977.55	626,616.18
63	Metalworking Machinery	3,513,034.80	3,935,652.89	100.00%	17.00%	3,363,805.89	571,847.00
64	Other General Industrial Machinery	6,953,284.40	7,789,764.51	100.00%	17.00%	6,657,918.39	1,131,846.13
65	Agriculture, Forestry, Animal Husbandry and Fishing Machinery	5,492,784.80	6,153,566.81	100.00%	13.00%	5,445,634.35	707,932.47
66	Other Special Industrial Equipment	18,270,246.90	20,468,157.60	100.00%	17.00%	17,494,151.80	2,974,005.81
67	Railroad Transport Equipment	1,386,951.90	1,553,802.21	100.00%	17.00%	1,328,036.08	225,766.13
68	Motor Vehicles	7,703,247.30	8,629,947.95	100.00%	17.00%	7,376,023.89	1,253,924.06
69	Ship Building	1,343,859.50	1,505,525.80	100.00%	17.00%	1,286,774.19	218,751.61
70	Aircraft	2,520,923.70	2,824,190.82	100.00%	17.00%	2,413,838.31	410,352.51
72	Other Transport Machinery	4,142,254.50	4,640,567.72	100.00%	17.00%	3,966,297.19	674,270.52
73	Generators	1,371,476.80	1,536,485.46	100.00%	17.00%	1,313,218.34	223,247.12
74	Household Electric Appliances	1,090,452.30	1,221,633.71	100.00%	17.00%	1,044,131.38	177,502.33
75	Other Electric Machinery and Equipment	2,592,206.80	2,904,049.28	100.00%	17.00%	2,482,093.40	421,955.88
76	Electronic Computer	822,129.20	921,031.34	100.00%	17.00%	787,206.28	133,825.07
77	Electronic Appliances	483,843.10	519,643.42	100.00%	17.00%	444,139.68	75,503.75
79	Other Electronic and Communication	6,138,536.40	6,877,002.33	100.00%	17.00%	5,877,779.77	999,222.56
80	Instruments, Meters and Other Measuring Equipment	955,039.30	1,069,930.53	100.00%	17.00%	914,470.54	155,459.99
81	Cultural and Office Equipment	128,192.40	143,613.95	100.00%	17.00%	122,746.96	20,866.98
83	Arts and Crafts Products	855,064.90	957,929.21	100.00%	17.00%	818,742.91	139,186.30
90	Construction	167,473,027.90	187,620,033.16	0.00%	0.00%	-	-
91	Railway Freight Transport	174,497.00	195,488.99	0.00%	0.00%	-	-
92	Highway Freight Transport	258,197.80	289,259.00	0.00%	0.00%	-	-
94	Water Freight Transport	25,122.80	28,145.07	0.00%	0.00%	-	-
95	Air Freight Transport	52,211.90	58,492.99	0.00%	0.00%	-	-
96	Transportation not elsewhere Classified and Auxiliary Body	73,551.20	82,399.41	0.00%	0.00%	-	-
100	Wholesale and retail Trade	3,267,002.90	3,660,023.35	80.00%	17.00%	2,502,580.07	425,436.61
108	Real Estate	1,868,700.00	2,093,504.61	0.00%	0.00%	-	-
	Sub-Total	251,541,999.70				72,024,609.12	12,026,358.18

E SUMMARY:

Private Consumption	174,163,475.88	28,971,481.35
Government Expenditures	26,946,048.22	4,743,868.88
Intermediate Purchases Denied ITCs	-	16,668,180.53
Fixed Asset Denied ITCs	72,024,609.12	12,026,358.18
Total	273,134,133.22	62,409,888.94
Compliance		62.37%
Change in Tax Revenues		227,141.55

Notes: Column (1) refers to gross expenditures by various entities, households, governments and businesses in 1997.
Column (2) shows the estimates of 1998 gross expenditures by using sectoral growth rates estimated by National Bureau of Statistics, P.R. China.
Column (3) shows the portion of expenditures subject to VAT. The percentages shown under the category of governments were estimated from the corresponding sectors in the intermediate use matrix of the 1997 Input-Output Table of China. For the tax base associated with the exempt activities, the figures were calculated as the percentage the total intermediates that were subject to VAT.
Column (4) denotes the VAT rate for the commodity category. For exempt output commodities, various intermediate inputs may be subject to different VAT rates.
Column (5) is the tax base exclusive of VAT in which the expenditures may be subject to either 13% or 17%.
Column (6) is the potential VAT revenue by ignoring bad debt allowances, tax free allowances for small importation, lower tax refunds to exporters, tax evasion, small suppliers exemption, and weak tax administration.

Sources: National Bureau of Statistics, Input-Output Table of China, 1997 (China Statistics Press, September 1999); and China Statistical Yearbook, 1998.

Appendix D

Parameters for Import Duty Receipts Model

Effective Tax Rates ²¹($\tau_{i,t}$):

1998 ($\tau_{i,t-1}$) – 2.69%
1999 ($\tau_{i,t}$) – 2.56%
2000 – 2.56%

Nominal Growth Rates in Imports:

1999 – 6.0%
2000 – 6.0%

Monthly Tax Receipts ($T_{i,t}$):

Actual Revenue for the first 7 months in 1998 ($T_{i,t-1}$) – 16,289 million yuans,

Actual Revenue for the first 7 months in 1999 ($T_{i,t}$) – 17,085 million yuans,

$$[(\sum_j T_{j,t}) / (\sum_j T_{j,t-1}) - 1] = 4.90\%$$

The weights used to calculate the adjustment factor (δ):

α -- 7/12
(1 – α) -- 5/12

The assumed elasticity:

η -- -0.05

²¹ The effective tax rate for 1998 is calculated by dividing import duty for 1998 (31,304 million yuans) by import value for 1998 (1,162,240 million yuans). See National Bureau of Statistics, China Statistical Yearbook 1999.

Appendix E

Parameters for Enterprise Income Tax Receipts Model

Effective Tax Rates ($\tau_{i,t}$):

1998 ($\tau_{i,t-1}$) – 3.72%
1999 ($\tau_{i,t}$) – 3.83%
2000 – 3.83%

Real GDP Growth Rates:

1999 – 7.5%
2000 – 7.5%

GDP Deflator:

1999 – 8.0%
2000 – 8.0%

Nominal Growth Rates $[(GDP_t / GDP_{t-1}) - 1]$:

1999 – 16.1%
2000 – 16.1%

Monthly Tax Receipts ($T_{i,t}$):

Actual Revenue for the first 7 months in 1998 ($T_{i,t-1}$) – 50,732 million yuans,

Actual Revenue for the first 7 months in 1999 ($T_{i,t}$) – 52,900 million yuans,

$$[(\sum_j T_{j,t}) / (\sum_j T_{j,t-1}) - 1] = 4.27\%$$

The weights used to calculate the adjustment factor (δ):

$$\begin{aligned} \alpha & \quad -- 7/12 \\ (1 - \alpha) & \quad -- 5/12 \end{aligned}$$

The assumed elasticity:

$$\eta \quad -- -0.05$$

