Contributing to the Individual Income Tax Reform Debate in China: Is Family Based Filing of Individual Income Tax Returns a Feasible Solution to the Social Problems Arising from the Increasing Family Income Inequality in China?

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Abstract: China's new wave of Individual Income Tax Reform is currently hotly debated. The Finance Minister, Lou Jiwei was reported to say that the relevant government departments in China – the State Council, the Ministry of Finance, and the State Administration of Finance had worked out a reform plan together in 2015. One goal of this plan is to move China's scheduler individual income tax to a global structure, and to put in place policies that contribute to income redistribution that takes into consideration family related expenditure, such as looking after the elderly and childcare.

A review of the literature shows that Chinese scholars and commentators suggest that China could learn directly from the US, adopt their global income tax system and allow family based filing of individual income tax returns. The literature does not provide reasons for this suggestion.

This paper performs a feasibility study to assess whether China could adopt the suggestions proposed by the prevailing literature. The study is performed based on a "revenue neutrality" analysis that compares projected revenue from existing policies, and that collectable if China allows family based individual income tax filing.

Results from a pilot study reports that the projected revenue from allowing family based individual income tax filing would be at a level that is closer to 40% of revenue collectable if China does not allow family based individual income tax filing. This result suggests that policy makers in China need to take careful considerations of costings before proceeding with the reform.

1. Introduction

Individual income tax reform in the People's Republic of China (PRC) has become a key part of the PRC's fiscal policy reform agenda. The PRC's rapid economic growth over the past years has seen the income of urban residents increase sharply.[1] Individual income tax plays an increasingly important role [2] in increasing government revenue and adjusting income distribution. The immaturity of the contemporary individual income tax system in the PRC induced the unjustified wealth redistribution to some extent.[3]

There have been numerous attempts at individual income tax reform; the current round of reform discussions began in 2011, after the tax rate reforms.[4] Recent reform suggestions suggested that the PRC should move from individual filing to family filing of tax returns.[5]

Chinese scholars and commentators[6] suggested that the People's Republic of China (PRC) could learn directly from the US, and adopt their global income tax system and allow family based filing of individual income tax returns. This paper reports a pilot feasibility study that assesses whether it is appropriate for the PRC to adopt family-based filing of individual income tax returns. The study is performed based on a "revenue neutrality" analysis[7] that compares projected revenue from existing policies, and that collectable if the PRC allows family based individual income tax filing.

A pilot study[8] is a small-scale preliminary study conducted before the intended study in order to evaluate the feasibility of the intended study. The reported feasibility study is the pilot study for further research on an individual income tax reform that captures tax filing issues. The design of the feasibility study is a quantitative experiment that has two modules. The first module is a forecast analysis[9] of the total individual income tax revenue based on the existing filing system. The data can be found from the National Bureau of Statistics of the People's Republic of China. Since the prevailing literature[10] proposes that the PRC learns from the US by considering its family based individual income tax filing system, module 2 replicates the US's filing system into the PRC. The second module is the estimation of the net present value of the forecasted total income tax revenue over 10 years under the family filing approach. The module calculates the average family income of a sample of couples matched according to different income earning capabilities. The second model applies the US filing methods to the PRC's current individual income tax system and calculates the national total net present value

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[1] Liang Q & Teng J, 'Financial Development and Economic Growth: Evidence from China.' (2006) 17 *China Economic Review* (4) 395-411.

[2] Gouveia M & Strauss RP, 'Effective Federal Individual Income Tax Functions: an Exploratory Empirical Analysis.' (1994) 47 *National Tax Journal* (2) 317-339.

[3] Zhang Y, 'Individual Income Tax Reform and Wealth Redistribution in China.' (2014) 7 *Journal of Politics and Law* (4) 112.

[4] 王宝利, 《我国个人所得税改革的新阶段》, Wang B, 'The New Stage of the Individual Income Tax Reform in the PRC', (2016) 8 China Business 94-95.

[5] Ibid.

[6] Li H, 'Family or Individual, Choices of Individual Income Tax Unit in China' (2011) 2 Journal of Public Finance Research (5) 31-34.
Zhang Y, 'Individual Income Tax Reform and Wealth Redistribution in China.' (2014) 7 *Journal of Politics and Law* (4) 112.
刘维, 《对个人所得税综合计征改革的思考》, Liu W, 'Considerations on Individual Income Tax Reform from Global System Perspective', (2016) 18 *Journal of Economics Sanjiang University* 148-154.

[7] Russell M, *Distributional Equity, Tax Neutrality and Tax Effectiveness: Issues in Tax Reform*, (Canberra: Australian National University, Centre for Research on Federal Financial Relations, 1985), at 28.

[8] Enrick NL, 'A Pilot Study of Income Tax Consciousness' (1963) 16 *National Tax Journal* 169-173.

[9] Xin R & oths, eds, *The China Society Yearbook, Volume 1 (2006): China's Social Development; Analysis and Forecast.* vol. 1, (Boston: BRILL, 2007), at 321.

[10] Above n234.

of individual income tax. The study then compares the revenue gap between the two filing systems.

The quantitative research aims to quantify the magnitude of the revenue gap between module one and two. Finally, whether it is appropriate to adopt family based individual income tax filing is assessed according to the criteria of tax revenue neutrality.[11]

1.1 The Revenue Neutrality Criteria

This pilot study of a feasibility study is based on a "revenue neutrality" analysis. The term "revenue neutrality" describes the situation[12] where the government should still receive the same amount of revenue despite changes in tax laws. In order to maintain the same level of tax revenue, the government may lower taxes for one particular group of people, while increasing taxes for another group. The term "revenue neutral" implies that there is no change in the amount of government revenue as the result of changes in the tax laws.[13]

A tax reform proposal that is revenue neutral will result in neither increases nor decreases in tax revenues compared to the existing tax system. That is, a proposal to increase taxes for one economic group must[14] include a mechanism to decrease tax revenues from another group in order to offset the revenue increase.

The "revenue neutral" concept has been implemented with the aim to improve the efficiency of the American tax system, which was the decisive factor in drafting the *Tax Reform Act*[15] of 1986 in the United States. Provisions estimated to add tax revenue were offset by opposite provisions to reduce revenue, which achieves revenue neutrality of the new bill for generating the same amount of revenue compared with previous law.[16]

The adoption of the value added tax in many European countries and the evidence of the *Tax Reform Act*[17] of 1986 in the US were claimed to be consistent with "revenue neutrality" criteria. The element[18] to achieve the goal of "revenue neutrality" includes lowering certain tax rates, broadening the tax base, closing loopholes and eliminating deductions. After analysing the concept of revenue neutrality, Brennan and Buchanan[19] claimed that the total amount of tax revenue works as the function of the tax base, as a broader tax base means more tax revenue will be collected. The *Tax Reform Act of 1986* contributed to major changes and constructions in the U.S. tax structure and it became effective in 1987. The purpose of the reform act was

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[11]Bradford DF, *Taxation, Wealth, and Saving*. (Massachusetts: MIT Press, 2000), at 167.

[12]Mankiw G & oths, 'Optimal Taxation in Theory and Practice', (2009) 23 *Journal of Economic Perspectives* (4) 147-174.

[13]Zhang L, 'Neutrality and Efficiency of Petroleum Revenue Tax: A Theoretical Assessment,' (1997) 107 *The Economic Journal* (443) 1106-1120.

[14]Young L, 'Distributional Neutrality and Optimal Commodity Taxation: Comment,' (1980) 70 *The American Economic Review* (1) 233-236.

[15]Tax Reform Act of 1986.

[16]Atkins C, Tax Reform and Revenue Neutrality: President's Panel Should Avoid the Redistribution of 1986, Online <http://taxfoundation.org/article/tax-reform-and-revenue-neutrality-presidents-panel-should-avoid-redistribution-1986> (30 Jul. 2016).

[17]Above n15.

[18]Gravelle JG. & Kotlikoff LJ, 'Corporate Taxation and the Efficiency Gains of the 1986 Tax Reform Act' (1995) 6 Economic Theory (1) 51-81.

[19]Brennan G & Buchanan JM, The Power to Tax: Analytical Foundations of a Fiscal Constitution, (Sydney: Cambridge University Press, 1980), at 55.

claimed by all parties to create a more efficient[20] tax system with the aim of raising the same amount of revenue, which is considered to be a revenue neutral reform.

Brennan and Buchanan[21] argued that broadening the tax base and lowering tax rates would result in the same amount of revenue being collected with lower excess burden. They examined data from 1986 U.S. Reform and the tax reforms in the European countries. Both cases showed that the tax reforms were undertaken with the aim to achieve revenue neutrality, and at the same time, lowering the excess burden[22] of taxation. As one of the costs of taxation, if the excess burden is being reduced, it is reasonable to expect that the government could collect more taxes. The theory behind the facts is that a reduction in the excess of the burden of taxation reduces the political cost of imposing taxes[23]. Their conclusion was that as revenue neutral tax reform could raise the same value of revenue with lower excess tax burden, the total government revenue would be increased. That is the reason why the government would like to maintain "revenue neutrality" criteria.[24]

The second purpose for adopting "revenue neutrality" criteria relates to the equity objectives, which aims to improve both vertical and horizontal dimensions about tax equity.[25] Vertical equity[26] in taxation refers to the idea that people with unequal income should be treated unequally, commensurately higher tax liabilities should be levied on taxpayers with higher incomes. On the other hand, horizontal equity in taxation is generally taken to require that individuals with similar income should pay the same amount in taxes.

Redistributive taxation reform[27] refers to the enhancement of equity from the vertical dimension through a reduction of after-tax income inequality. Policy makers implemented the reform plans with the intention to leave the income distribution fundamentally unchanged, which is known as distributional neutral reform. Rectifying inequity from the horizontal dimension is the ordinary intention for the government to perform redistributive and distributional neutral tax reform.

1.2 Study Methodology

This study focuses on individual income tax. The pilot study[28] has consulted the optimal income tax model theories proposed by Edgeworth[29] and Stern[30] and the optimal income tax model proposed by Mirrlees.[31] These theories are the basis for performing income tax analyses on public policies. They are integral parts of the public economics and tax economics literature.[32]

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[20]Above n245.

[21]Above n246.

[22]Holcombe RG. & Mills JA, 'Is Revenue-Neutral Tax Reform Revenue Neutral', (1994) 22 *Public Finance Review* (2) 65-85.

[23]Ibid.

[24]Eaton J & Rosen HS, 'Optimal Redistributive Taxation and Uncertainty', (1980) 95 *The Quarterly Journal of Economics* (2) 357-364.

[25]Cubel M & Lambert P, 'Progression Neutral Income Tax Reforms and Horizontal Inequity*'*, (2002) 77 *Journal of Economics* 1-8.

[26]Berliant MC & Strauss RP, *The Horizontal and Vertical Equity Characteristics of the Federal Individual Income Tax, 1966-1977 Horizontal Equity, Uncertainty, and Economic Well-Being.* (US: University of Chicago Press, 1985), at 205.

[27]Dixit A & Londregan J, 'Redistributive Politics and Economic Efficiency', (1995) 89 *American Political Science Review* (4) 856-866.

[28]Huang E, Fiscal Considerations for Sustainable Public Funding of Urban Old-Age Pensions in the People's Republic of China, *Working Paper 2016*, The University of Sydney, 2016.

[29]Edgeworth FY, 'The Pure Theory of Taxation', (1897) 7 *The Economic Journal* (25) 46.

[30]Stern NH, 'On The Specification of Models of Optimum Income Taxation', (1976) 6 *Journal of Public Economics* 123.

[31]Mirrlees JA, 'An exploration in the theory of optimal income taxation', (1971) 38 *Review of Economic* Studies 175; and Mirrlees JA, 'Optimal tax theory: A synthesis', (1976) 6 *Journal of Public Economics* 327.

[32]See for example: Kaplow L, *The Theory of Taxation and Public Economics*, (Princeton and Oxford: Princeton University Press, 2008); Rosen, HS & Gayer T, *Public Finance*, (Beijing: McGraw-Hill Companies, Inc. & Tsinghua University Press, 8th ed, 2008); Stiglitz JE,

The pilot study has an experimental research design. Experimental research[33] describes the process that a researcher undergoes when controlling certain variables and manipulating others to observe if the results of the experiment reflect that the manipulations directly caused the particular outcome.

This study has two modules. Module 1 estimates the net present value[34] of national individual income tax revenue under the individual filing approach. Module 2 predicts the net present value of national individual income tax revenue under the family-based filing approach.

The revenue forecast procedures are:

-   Find the most recent data on total individual income tax revenue in the PRC under the two filing approaches, and then apply the growth rate factor to inflate and forecast the amount for the next 10 years.
-   Once the estimated amounts of individual income tax over the next 10 years have been calculated, apply the discount factor to discount the estimated future value back to the initial year for comparative purpose.
-   Add the present value from each year's forecast together and get the total net present value.[35]

1.3 Determinants of the Growth Rate

In order to construct a revenue forecast over ten years, the research inflates the individual income tax from the base year to the next 10 years based on the growth rate. This section discusses the determinants of the growth rate.

1.3.1 Growth Rate Determinants: GDP Growth

Within this research, the growth rate for income tax revenue was determined by the growth rate of gross domestic product (GDP) in the secondary and tertiary industries of the PRC of the base year.

Gross domestic product[36] refers to the market value of all officially recognised final goods and services produced within a country in a given period of time. GDP is commonly used as an indicator of a country's economic health, as well as to gauge a country's living standard.[37] Increasing the rates of economic growth will result in increased consumption, improved public services and reduced unemployment and poverty.

Tax[38] is a finance charge or other levy imposed upon a taxpayer (an individual or legal entity) by government, such that failure to pay is punishable by law.

Economics of the Public Sector, (New York: W.W.Norton & Company, 3rd ed, 2000); and 萨拉尼、伯德著,陈新平、王瑞泽、陈宝明、周宗华译,《税收经济学》, Salanié B, *The Economics of Taxation*, Chen X & oths, trans, (Beijing: China Renmin Press, 2009).

[33]Creswell JW, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, (New York: Sage publications, 2013).

[34]Reyck BD & oths, 'Project Options Valuation with Net Present Value and Decision Tree Analysis', (2008) 1 *European Journal of Operational Research* (184) 341-355.

[35]Ibid.

[36]Williamson, SD, *Macroeconomics*, 5th ed., (Melbourne: Pearson, 2013), at 446.

[37]Brokaw SC & oths, 'GDP Source as an Indicator of Economic Health' (2009) 9 *Review of Business Research* (4)1.

[38]Khoury D, *Tax*, 8th ed, (Chatswood: LexisNexis Butterworths, 2015), at 34.

The PRC's economy has leapt forward since the PRC embarked on a major program of economic reform to encourage the formation of rural enterprises and private businesses, promote foreign investment and trade and invest in industrial production.[39] The tax system also contributed to this evolvement. For example, the GDP and tax revenue of Hebei[40] Province have achieved both developments since the 1994 tax-sharing reform. As individuals tend to earn increasing amount of income and over the years during the stages of economic growth, more income tax liability will be incurred correspondingly. The increase in the income tax rate and GDP growth rate is highly correlated.

1.3.2 Considerations of Not Adopting the Urban Economy Growth Rate as the Inflation Factor

The development of the urban economy includes the broad aspects of urban issues such as[41] public transit, housing, local government finance, crime and education. The vast differences[42] in development between Western and Eastern China revealed the issue of unbalanced regional developments in the PRC. Giani[43] selects Xinjiang, Gansu and Sichuan provinces as representatives for Western China and Shanghai, Shandong and Zhejiang to represent Eastern China, and calculates the GDP Per Capita and education spending figure from the National Bureau of Statistics from 1980 to 2010. These figures are put into charts for comparison.

Table 1 GDP Per Capita and Education Spending in West and East China from 1980 to 2010[44]

GDP Per Capita	West			East		
	Xinjiang	Gansu	Sichuan	Shanghai	Shangdong	Zhejiang
1980	410	388	320	2725	402	471
1985	820	608	570	3811	887	1067
1990	1713	1099	1136	5911	1815	2138
1995	4701	2316	3043	17779	5701	8149
2000	7372	4129	4956	30047	9326	13415
2005	13108	7477	9060	49649	19934	27062
2010	25034	16113	21182	76074	41106	51711
Education Spending	Xinjiang	Gansu	Sichuan	Shanghai	Shangdong	Zhejiang
1980	206.58				532.96	
1985	456.41				975.65	
1990	749.37				2020.6	
1995	1878.32		3782.81		5237.54	
2000	3135.38	2754.77	6480.48	8410.31	11810.42	7819.43
2005	7265.17	6748.31	14052.6	18294.15	24874.84	23154.89
2010	31383.56	22823.29	54065.46	41727.75	77044.72	60654.31

Table 1 demonstrates the figure of GDP Per Capita and education spending in the West and East of China over the 30 years between 1980 and 2010.

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[39]Arnold C & Lin W, *China's Economic Reforms*. (Philadelphia: University of Pennsylvania Press, 1982), at 553.

[40]Feng Y & Eko S, 'The Relationship between Tax Revenue and Economic Growth of Hebei Province Based on the Tax Multiplier Effect', (2014) 7 *Global Economy and Finance Journal* (2) 1-18.

[41]Smith ME & Hamilton BW, *Urban Economics*, (US: Scott Foresman, 1994).

[42]Dijk MP, 'A Different Development Model in China's Western and Eastern Provinces', (2011) 2 *Modern Economy* 757-768.

[43]Giani C, China's Unbalanced Development and What can Learn from It. *Senior Theses*, Trinity College Hartford, 2014.

[44]Ibid.

Table 2 Western and Eastern Region Economic Development[45]

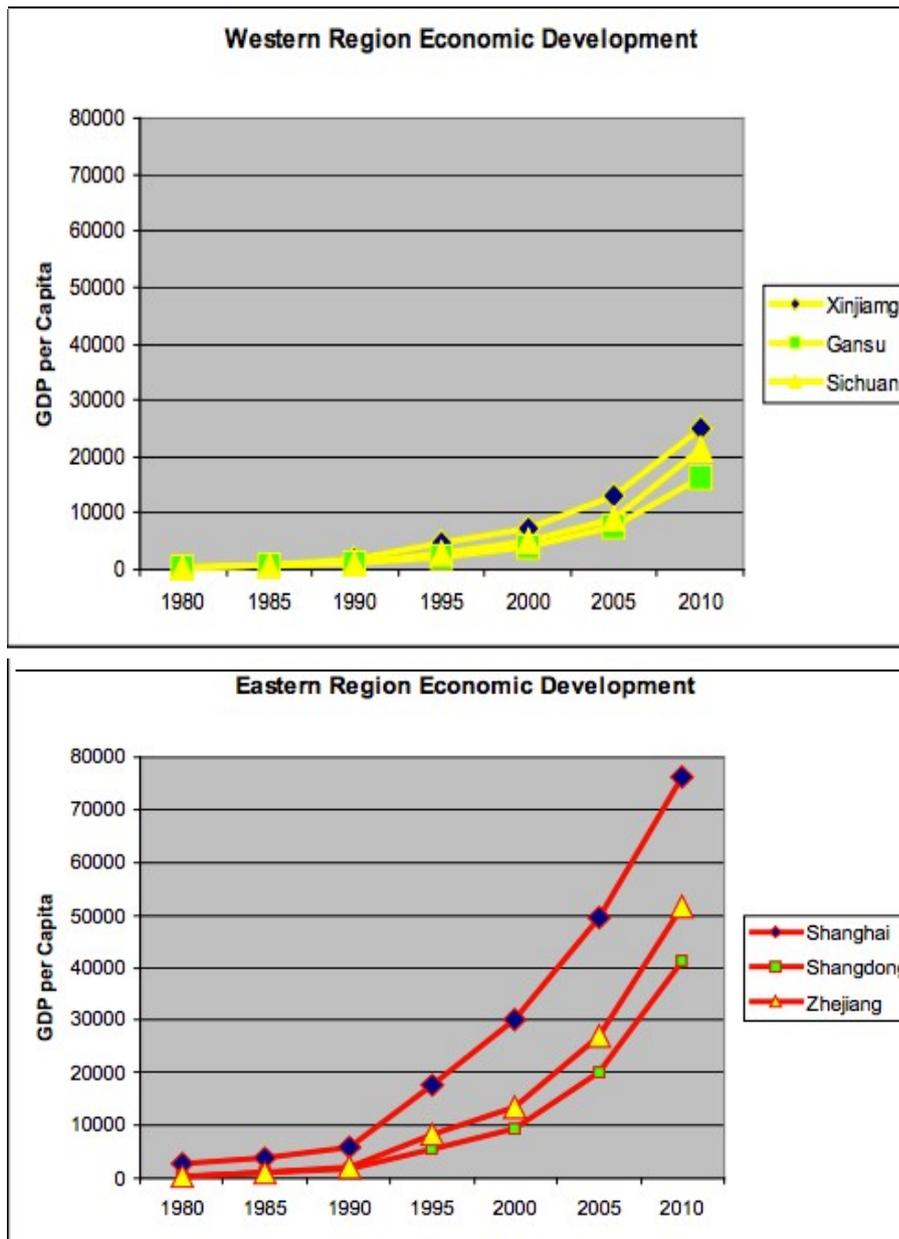Table 2 shows the economic growth measured in GDP per Capita in both the Western and Eastern Region.

It is clear from the three above tables that the GDP per Capita in Eastern China is nearly four times of that in Western China, and it is clearly visible at a first glance that the Eastern regions have an economic development that is increasing at a rate which is much greater than that of the Western regions.

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[45]Above n270.

This research aims to forecast[46] the nationwide individual income tax revenue. Due to the development imbalance between the cities in China, it is argued that the urban economy growth rate would not serve as the most accurate measure to compound[47] income tax revenue over the years.

There is another concern regarding the appropriateness to consider the growth rate of citizen's income[48] in the urban area as the growth rate of individual income tax. As the individual income tax is the result of the application of progressive tax rate on the individual income, the growth rate of income cannot serve as the only determinant of the income tax rate growth. Thus, it is required from a more general approach to decide on the growth rate for individual income tax.

1.3.3 Considerations for Not Adopting CPI as the Growth Rate

The Consumer Price Index[49] (CPI) is a measure that examines the weighted average prices of a basket of goods and services for consumption, such as transportation, food, beverage and medical care. Each good in the basket is weighted according to the proportion of average household expenditure accounted for by that good. The CPI[50] demonstrates the change in prices of the basket from the base year to a particular given year. Changes in the CPI are used as indicators to illustrate price changes associated with living costs.

The PRC's CPI figure is reported by the National Bureau of Statistics of China from 1986 to 2016. The average figure[51] for CPI is 105.46 Index Points, reaching a peak of 128.40 Index Points in February of 1989 and a low of 97.80 Index Points in April of 1999. There is a decrease in Index Points from 2011 to 2012, reaching 104.3 Index Points at the start of the year 2012.

The CPI is one of the most frequently used indicator measures for inflation, despite the fact that it is not the most appropriate figure for measuring the growth rate for income tax revenue growth.

Based on its definition, the CPI is the index number calculated using a specific set of 600 retail the goods and services[52], the calculation procedures involved include selecting a certain period as the base period and calculating the prices for a basket of goods and services, collecting price data for the same basket of goods on a monthly basis, and then comparing the prices from the base period with the prices from a different time period.

The CPI represents prices paid by consumers (or households) for their consumption, while the individual income tax is the tax levied on taxable income.[53] Income is the process of production,[54] which means people earn revenue based on the goods or services generated by

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[46]Mikesell JL & Ross JM, 'State Revenue Forecasts and Political Acceptance: the Value of Consensus Forecasting in the Budget Process' (2011) 74 *Public Administration Review* (2) 188-203.

[47]Castellanos AR, 'Tax Strategies Available under Income Forecast Method*'* (1994) 25 *The Tax Adviser* (7) 419.

[48]Rankin A, 'Citizen's Income' (2004) 16 *European Business Review* (6) 632.

[49]Mankiw GN, *Principles of Macroeconomics*. (Melbourne: Cengage Learning, 2014), at 412.

[50]Tutterow R, 'Evidence on Commodity Prices as a Leading Indicator of CPI Inflation', (1995) 23 *Atlantic Economic Journal* (2), 148.

[51]Trading Economics, *China Consumer Price Index*, Online
<http://www.tradingeconomics.com/china/consumer-price-index-cpi> (10 Sep.2016).

[52]Svensson L, 'Open Economy Inflation Targeting', (2000) 50 *Journal of International Economics* 155-183.

[53]Above n276.

[54]Goode R, *The Individual Income Tax*, (Brookings institution: 1964), at 541.

themselves.[55] Conceptually, the consumption based measurement of the CPI Index does not match the core production based income tax concept.

Secondly, the CPI measures the price level of consumer goods for households from both rural and urban areas. In rural areas, peoples' major income source comes from the primary industry.[56] Based on the source of income, individual income tax is most likely not to be levied on individuals from rural areas. Thus, the CPI is not able to correctly reflect the individual income tax features.

1.3.4 Reasons for Not Including the Primary Industry in the Calculation

The calculation for the growth rate includes the GDP growth rate of secondary and tertiary industries rather than the primary sector. The primary sector[57] in China is the sector of an economy making direct use of natural resources. This includes agriculture, fishing, mining and forestry. In contrast, the secondary sector converts[58] the raw material produced by primary sector into commodities and produces manufactured goods, whilst the tertiary industry is concerned with the production of services.

The eleven categories of income taxable by the individual income tax are prescribed by Article 2 of the *Individual Income Tax Law of the People's Republic of China.*[59]

Table 3 Eleven Categories of Income

1	Income from salaries and wages
2	Income from production, operation derived by industrial and commercial households
3	Income from contractual or leasing operations to enterprises or institutions
4	Income from remuneration for personal services
5	Income from author's remuneration
6	Income from royalties
7	Income from interest, dividends and bonuses
8	Income from the lease of property
9	Income from the transfer of property
10	Incidental income
11	Income from other sources specified as taxable by the department of finance under the State Council

Table 3 is a summary of the eleven categories of income as prescribed in the individual income tax law. Income derived from the primary industry ordinarily is not included in the taxable income base. It is common that only people living in the urban areas will normally lodge individual income tax returns in the PRC. The growth rate for the primary sector in the PRC is thereby not related[60] to income tax revenue growth, and, it is unnecessary to include the GDP growth rate of the primary industry in the calculation.

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[55]Ibid.

[56]Fisher A, 'Production, Primary, Secondary and Tertiary.' (1939) 15 *Economic Record*, (1) 24-38.

[57]Ibid.

[58]Ibid.

[59]《中华人民共和国个人所得税法》*Individual Income Tax Law of the People's Republic of China* 2011 (Standing Committee of the National People's Congress), Art 2.

[60]Above n283.

The next step in the study is to apply the average growth rate to calculate the forecasted value[61] over the 10 years. The compound formula to calculate the future value is:

$$P_n = P_0(1 + r)^n$$

P_n is future value of P_0
P_0 is original amount invested
r is the rate of interest
n is the number of compounding periods (years, months, etc.)

1.3.5 The Determinants of the Discount Rate

After calculating the forecasted amount for income tax revenue in each year, the discounted cash flow[62] method is applied to estimate the present value. The discounted cash flow analysis uses future cash flow amount and discounts them back to a present value estimate. The following is the formula for net present value:

$$DCF = \frac{CF1}{(1+r)^1} + \frac{CF2}{(1+r)^2} + \cdots + \frac{CFn}{(1+r)^n}$$

CF = Cash Flow
r = Discount rate (WACC)

CF_n refers to the estimated national individual income tax revenue in each year since the base year, and DCF is the sum of the net present value. As the estimated amount could be, the only determinant in this case is the discount rate "r".

According to Caplin and Leahy,[63] the social discount rate is the discount rate applied to social funds. When the social fund lasts over a long period, the discount rate is a critical parameter in cost-benefit analysis whenever costs and benefits differ in their distribution over time.[64] The choice of the appropriate discount rate will affect the quality of the cost-benefit analysis,[65] which will be used to improve decision making by systematically evaluating the social benefits and costs of government policies, with an emphasis on valuing them in monetary terms.[66]

Many scholars used the social discount rate as the discount factor to find the present value of the estimated government revenue.[67] The individual income tax forms an important and continuous stream of national revenue for the PRC, so it is appropriate to use the social discount rate in this pilot study. The social discount rate in 2014 is 7%.[68]

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[61]Damodaran A, *Corporate Finance*. (US: Wiley,1996), at 102.
[62]Cabinet Office, *Discount Rates and Net Present Value*, Online
<https://data.gov.uk/sib_knowledge_box/discount-rates-and-net-present-value> (01 Sep.2016).
[63]Caplin A & Leahy J, 'The Social Discount Rate', (2004)112 *Journal of Political Economy* (6) 1257-1268.
[64]Huang E & Underwood N, 'The Impact of Tax Holidays on Renewable Energy Project Development in China: A Cost Benefit Analysis' (2013) 3 *Journal of Chinese Tax and Policy* (2) 270-273.
[65]Harrison M, Valuing the Future: The Social Discount Rate in Cost-Benefit Analysis, *Visiting Researcher Paper April 2010*, Australian Government Productivity Commission,<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.627.7762&rep=rep1&type=pdf> (30 Jul. 2016).
[66]Congressional Budget Office, Forecasting Individual Income Tax Revenues: a Technical Analysis, *Special Study August 1983*, Congress of the United States. <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/50xx/doc5044/doc16-entire.pdf> (30 Aug.2016).
[67]Zhuang J & oths, Theory and Practice in the Choice of Social Discount Rate for Cost-Benefit Analysis: a Survey, *Working Paper 94*, Asian Development Bank, 2007.
[68]Above 291.

2. Feasibility Study Results

This part illustrates the calculation procedures for Module 1 and Module 2. There are three steps in Module 2 to conclude the forecasted national individual income tax revenue under a family-based approach in the People's Republic of China (PRC).

2.1 Module 1: Revenue Forecast under Individual Based Filing Approach

Module 1 generates the calculation of the 10-year-forecast for individual income tax revenue of the PRC under the existing individual based income tax filing system.

The revenue forecast procedures are:
1. Find the most recent data on total individual income tax revenue in the PRC, and then apply the growth rate factor to inflate and forecast the amount for the next 10 years.
2. Once the estimated amounts of individual income tax over the next 10 years have been calculated, apply the discount factor to discount the estimated future value back to the initial year for comparative purpose.
3. Add the present value from each year's forecast together and get the total net present value.[69]

The most recent data for individual income tax can be found on the National Bureau of Statistics of China website. The website gives the available data until the year 2014. From the chart, the total amount of individual income tax in 2014 is RMB 7,376.61bn.[70]

Table 4 Annual Tax Figure in 2014 in the PRC[71]

Database：Annual	
Indicators	2014
Taxes(RMB billion)	119,175.31
Domestic Value-added Tax(RMB billion)	30,855.36
Business Tax(RMB billion)	17,781.73
Domestic Consumption Tax(RMB billion)	8,907.12
Tariffs(RMB billion)	2,843.41
Individual Income Tax(RMB billion)	7,376.61[72]
Corporate Income Tax(RMB billion)	24,642.19
Data Sources：National Bureau of Statistics	

Table 4 lists the individual income tax amount as in year 2014. The research sets 2014 as the initial year to construct the 10-year-forecast, which spans from year 2014 to year 2024. The

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[69]Reyck BD & oths, 'Project Options Valuation with Net Present Value and Decision Tree Analysis', (2008) 1 *European Journal of Operational Research* (184) 341-355.

[70]Equivalent to AUD 1475.32bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[71]National Bureau of Statistics of China, < http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0806&sj=2014>.

[72]Ibid.

reason to set a forecast timeline of 10 years is because the input for the estimation (such as the inflation factor and discount factor) is reasonable and accessible, which adds reliability to the research. It is a common timeline chosen by scholars[73] to construct their revenue side forecast.

2.1.1 Calculation and Application of the Growth Rate

The research then inflates the individual income tax as in 2014 to the next 10 years based on the growth rate.

1. Calculation of the Growth Rate

The calculation of the growth rate[74] involves two processes. The first step works out the difference between the amount of GDP in the secondary and tertiary industries in the years 2013 and 2014, and the second step divides the increase amount by the GDP in the secondary and tertiary industry in 2013.

The growth of GDP ($\triangle$GDP) in the secondary and tertiary industries from 2013 to 2014 equals to the sum of GDP in the secondary and tertiary industries [GDP_{2014} (S.I. + T.I.)] in 2014, less the sum of GDP in the secondary and tertiary industries in 2013. [GDP_{2013} (S.I.+T.I.)]

The GDP growth rate [GR] equals to the increase amount of GDP ($\triangle$GDP) from 2013 to 2014 divided by the amount of GDP in secondary and tertiary industry in 2013. [GDP_{2013} (S.I.+T.I.)]

The formula used to calculate the GDP growth rate [GR] in 2014 is

$$[GR] = \frac{\triangle GDP}{GDP_{2013}\ (S.I.+\ T.I.)}$$

$$= \frac{GDP_{2014}(S.I.+\ T.I.) - GDP_{2013}(S.I.+T.I.)}{GDP_{2013}\ (S.I.+\ T.I.)}$$

Table 5 Annual GDP of Secondary and Tertiary Industries

Database: Annual[75]

Year：LATEST10		
Indicators	2014	2013
Gross National Income(RMB 1 billion)	644,791.1	590,422.4
Gross Domestic Product(RMB 1 billion)	643,974.0	595,244.4
Value-added of the Primary Industry(RMB 1 billion)	58,343.5	55,329.1
Value-added of the Secondary Industry(RMB 1 billion)	**277,571.8**	**261,956.1**
Value-added of the Tertiary Industry(RMB 1 billion)	**308,058.6**	**277,959.3**
Per Capita GDP (RMB)	47,203	43,852

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[73]Golosov M & King J, Tax Revenue Forecasts in IMF-Supported Programs, *Working Paper 02/236*, International Monetary Fund, 2002.

[74]Kuznets SS, & Murphy JT. *Modern Economic Growth: Rate, Structure, and Spread*. (New Haven: Yale University Press, 1966), at 251.

[75]National Bureau of Statistics of China, < http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0806&sj=2014>.

Table 5 lists the annual GDP of secondary and tertiary industries in 2013 and 2014.

The GDP growth rate [GR] = (277571.8+308058.6) - (261956.1+277959.3)/ (261956.1+277959.3) = 0.084671=8.467%

The average rate for income tax growth is approximately 8.5%.

2. Compound for Future Value

Money has a different value over the course of time,[76] in which the value of money is deflated by inflation and opportunity cost as time passes. In other words, money held today is worth than money held tomorrow.

The next step in the study is to apply the average growth rate to calculate the forecasted value[77] for the total individual income revenue for 2015 to 2024. The compound formula to calculate the future value is:

$$P_n = P_0(1 + r)^n$$

P_n is future value of P_0
P_0 is original amount invested
r is the rate of interest
n is the number of compounding periods (years, months, etc.)

In this research, P_0 is the initial amount of the forecast;
P_0 =RMB 7376.61bn[78]
R is the average growth rate, r=8.467%

Calculate the corresponding forecasted future amount for each year. The results are reported in Table 2.3

Table 6 Module 1: Individual Income Tax Forecast under Individual Based Filing Approach.

Individual Income Tax Forecast under Individual Based Filing Approach. (RMB Billion)										
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Forecasted Amount	7377	8001	8679	9413	10210.55	11075.082	12013	13030	14133	15330	16628

Table 6 is the summary of the results of the forecasted income tax revenue under an individual based filing approach.

2.1.2 Application of the Discount Rate and Calculation of the Net Present Value

After calculating the forecasted amount for income tax revenue in each year, the discounted cash flow[79] method is applied to estimate the present value. Discounted cash flow analysis uses

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[76]Halperin D, 'Interest in Disguise: Taxing the Time Value of Money', (1986) 95 *The Yale Law Journal* (3) 506-552.
[77]Damodaran A, *Corporate Finance*. (US: Wiley, 1996), at 545.
[78]Equivalent to AUD 1475.32bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.
[79]Above n289.

the future cash flow amount and discounts them back to a present value estimate. The following is the formula for the net present value:

$$DCF = \frac{CF1}{(1+r)^1} + \frac{CF2}{(1+r)^2} + \cdots + \frac{CFn}{(1+r)^n}$$

CF=Cash Flow
r=discount rate (WACC)

This study substitutes the forecasted amount into the discounted cash flow formula, with the social discount rate at 7%.[80] $(r = 7\%)$

CF_n is the forecasted amount in each year developed in the previous stage.

$$DCF = 7376.61 + \frac{8001.193}{(1+7\%)^1} + \frac{8678.659}{(1+7\%)^2} + \frac{9413.487}{(1+7\%)^3} + \frac{10210.53302}{(1+7\%)^4} + \frac{11075.06572}{(1+7\%)^5} + \frac{12012.8}{(1+7\%)^6} + \frac{13029.93}{(1+7\%)^7} + \frac{14133.18}{(1+7\%)^8} + \frac{15329.84992}{(1+7\%)^9} + \frac{16627.83862}{(1+7\%)^{10}}$$

Table 7 summarises the net present value for the forecasted amount as in each year, and the sum of those net present values is the total net present value.

Table 7 the Net Present Value of Individual Income Tax Forecast under Individual Based Filing Approach

Individual Income Tax Forecast under Individual Based Filing Approach. (RMB Billion)										
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Forecasted Amount	7377	8001	8679	9413	10211	11075	12013	13030	14133	15330	16628
Net Present Value	7377	7478	7580	7684	7790	7896	8005	8114	8226	8338	8453
Total Net Present value											86941

According to the table, the total net present value of total income tax revenue for Module 1 is RMB 86,941bn.[81]

2.2 Module 2: Revenue Forecast under a Family Based Filing Approach

In the second module, the research applies the filing model in the US to the PRC's individual income tax system, in order to forecast the total income tax revenue based on family filing in the next 10 years.

2.2.1 Assumptions for Module Two

This feasibility study makes three assumptions.

Assumption 1: The family unit in this research is the urban nuclear family.

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[80] Above n291.
[81] Equivalent to AUD 17,388bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

Assumption 2: All married taxpayers choose "married filing jointly"[82] as the filing status.

Assumption 3: The singles rate[83] in the urban population is the same as the singles rate for the whole population.

A nuclear family[84] is a family group consisting of two legally married adults and their dependents. Since China is going to learn directly from the U.S. about their family based filing approach, the quantitative research design will use the nuclear family as the family structure. In the PRC's urban areas, the common family structure is two married individuals with a dependent child.[85] According to the Sixth National Population Census of the People's Republic of China,[86] the average number of people in a family was 3.1 in 2011; therefore, the nuclear family is the predominant family structure[87] in Chinese cities.

In the US, the federal tax filing status prescribes[88] the type of tax return form an individual could use. There are three possible filing statuses for family lodgement; Married Filing Jointly,[89] Married Filing Separately,[90] and Head of Household.[91] If more than one filing status applies to the taxpayer, the taxpayer will choose the one that gives them the lowest tax liability.[92] This pilot study chooses married filing jointly as the filing status and assumes this method gives the taxpayers the lowest tax. In reality, everything being equal, taxpayers will only choose the one which gives them the most tax benefits among those available filing statutes, so the actual total individual income tax revenue could only be less than the estimated amount based on married filing jointly status.

2.2.2 Internal Methodology

This research estimates the total individual income tax revenue for 10 years from year 2014, based on a family based individual income tax filing system. Under the assumption of the urban nuclear family, the research starts with the individual annual income of each spouse, then calculates the family annual income by combing their income, and finally divides the total family annual income by 2 to identify the average family annual income per person.

The study divides the average income per person based on family unit by 12 to calculate the monthly income[93] and applies the progressive individual income tax rate for the monthly income tax payable. Finally, the research multiplies the monthly income tax by 12 to find the annual income tax amount per person, and identifies the total population[94] in the urban labour force. In order to identify the total national income tax revenue of taxpayers who are married

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[82]*The Internal Revenue Code of 1986*, Section 1.

[83]Zhang Y & Hannum E, 'Diverging Fortunes: The Evolution of Gender Wage Gaps for Singles, Couples, and Parents in China' (2015) 1 *Chinese Journal of Sociology* (1)15-55.

[84]Aaberge R, 'Gini's Nuclear Family.' (2007) 5 *The Journal of Economic Inequality*, (3) 305-322.

[85]Shin HB, 'Contesting Speculative Urbanisation and Strategising Discontents' (2014)18 *Journal City* 4-5.

[86]National Bureu of Statistics in the PRC, <http://data.stats.gov.cn/english/easyquery.htm?cn=C01>.

[87]Above n312.

[88]Above n309.

[89]Above n309.

[90]*The Internal Revenue Code of 1986,*Section 2.

[91]Ibid.

[92]Internal Revenue Service, *Publication 501 Exemptions, Standard Deduction, and Filing Information for use in preparing 2015 Returns*, Department of the Treasury, the US Government, 29 Dec.2015.

[93]The Individual Income Tax Law of the People's Republic of China prescribes the tax rates for monthly income.

[94]National Bureau of Statistics of the People's Republic of China, <http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0403&sj=2014>.

and filed the income tax return on family basis, the research multiplies the annual individual income tax per head by the population in the labour force.

For one person households, taxpayers should continue with the current income tax filing system to lodge their income tax on an individual basis. There are two types of taxpayers; taxpayers who are part of an urban nuclear family, and taxpayers who are in a one person households. In order to calculate the amount of individual income tax for single taxpayers, it is necessary to apply the singles rate of the taxpayers within the labour force to the current national individual income tax amount in 2014. The singles rate out of the total population is applied to total urban individual income tax revenue of the base year 2014.

2.2.3 Step 1 - Changes in National Individual Income Tax Revenue

This step aims to compare the NPV of the 10-year-forecast[95] for national individual income tax revenue under the existing filing approach with the forecasted NPV of 10 years' income under family based filing status.

2.2.3.1 Calculate the NPV under the Family Based Filing Approach.

Under the urban nuclear family assumption, the research needs to estimate family annual income. Families use their total income amount to prepare for the filing of the individual income tax return for each income earning member under the family based filing system. In order to estimate family income, the first step is to estimate the individual family member's annual income separately. The assumption determines that there are two income earners in the urban nuclear family.[96]

The National Bureau of Statistics of China prepares statistics for seven unevenly distributed income brackets as shown in Table 8. The per Capita Total Income[97] is the average individual annual income within the bracket.

Table 8 Per Capita Total Income of Urban Households

Decile Groups	Per Capita Total Income of Urban Households(RMB) 2012
Per Capita Total Income of Urban Households, Lowest Income Households(10%)(RMB)	9209.5
Per Capita Total Income of Urban Households, Low Income Households(10%)(RMB)	13724.7
Per Capita Total Income of Urban Households, Lower Middle Income Households(20%)(RMB)	18374.8
Per Capita Total Income of Urban Households, Middle Income Households(20%)(RMB)	24531.4
Per Capita Total Income of Urban Households, Upper Middle Income Households(20%)(RMB)	32758.8
Per Capita Total Income of Urban Households, High Income Households(10%)(RMB)	43471

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[95]Kaplan S & Ruback R, 'The Valuation of Cash Flow Forecasts: An Empirical Analysis', (1995)50.4 *The Journal of Finance* 1059-1093.

[96]Above n312.

[97]McAuley A, *Economic Welfare in the Soviet Union: Poverty, Living Standards, and Inequality.* (Madison: University of Wisconsin Press, 1979).

Per Capita Total Income of Urban Households, Highest Income Households(10%)(RMB)	69877.3

Table 8 is reproduced from the 2012 statistics.[98] In order to ascertain that the result of the estimation is representative, this research selects[99] individuals from the seven different groups and matches them as a pair, resulting in 28 types of pairs.

Each of the seven income distribution groups are assigned their own order ID (see Table 2.6), where the aim is to sort numerically. Then, two order IDs are combined from the groups to generate the pair matching[100] . The matching pairs need to cover all possible combinations.

Table 9 Order ID for Income Distribution Groups[101]

Decile Groups Year 12	Per Capita Total Income of Urban Households(yuan)	Order Number
Per Capita Total Income of Urban Households, Lowest Income Households(0-10%)(RMB)	9209.5	1
Per Capita Total Income of Urban Households, Low Income Households(10%-20%)(RMB)	13724.7	2
Per Capita Total Income of Urban Households, Lower Middle Income Households(20%-40%)(RMB)	18374.8	3
Per Capita Total Income of Urban Households, Middle Income Households(40%-60%)(RMB)	24531.4	4
Per Capita Total Income of Urban Households, Upper Middle Income Households(60%-80%)(RMB)	32758.8	5
Per Capita Total Income of Urban Households, High Income Households(80%-90%)(RMB)	43471	6
Per Capita Total Income of Urban Households, Highest Income Households(90%-100%)(RMB)	69877.3	7

Table 9 lists the seven income distribution groups with their own order ID.

2.2.3.2 Matched Pairs

Table 10 reports the possible combinations of the pair matching. The numerical number represents the Order ID of different income groups.

Table 10 Possible Combination Groups of Income from Urban Households

All Possible combinations among 7 different groups						
1,1						
1,2	2,2					
1,3	2,3	3,3				

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[98]National Bureau of Statistics of the People's Republic of China, <http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0403&sj=2014>.

[99]Kothari CR, *Research Methodology: Methods and Techniques*. (New Delhi: New Age International, 2004),at 212.

[100]Casella G, *Statistical Design*, (Berlin: Springer, 2008), at 447.

[101]National Bureau of Statistics of the People's Republic of China, <http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0403&sj=2014>.

1,4	2,4	3,4	4,4			
1,5	2,5	3,5	4,5	5,5		
1,6	2,6	3,6	4,6	5,6	6,6	
1,7	2,7	3,7	4,7	5,7	6,7	7,7

Table 10 is the summary of the possible combinations of the pair matching. There are 28 combinations to pair a couple based on different income groups. The family income of each of the 28 pairs is calculated, and the family income of each pair is then evenly attributed to the individuals. The individual income tax rate is then applied to calculate the individual income tax liability.[102] Note that as the data is only available to 2012, the income tax result is for the year 2012.

For each matched pair, the research sets the Per Capita Total Income of Urban Households[103] from each bracket as the family member's annual income, sums the two members' income for the family's income, divides the total family income by 2 to calculate the average annual income in that family, and finally divides the result by 12 for the individual's average monthly income.

This pilot study tests the revenue neutrality if China adopts the US individual income tax filing scheme, where taxpayers are allowed to file as a member of a family. The family revenue reported are comprehensive, and are not separated into the eleven categories in the *Individual Income Tax Law of the People's Republic of China,[104]* thereby per family member monthly income calculated in this research captures all income types of the taxpayer. The results illustrate the income derived from a global[105] individual income tax system.

The US implements a progressive[106] individual income tax rate, where the single rate was applied to the total comprehensive global income derived by an individual. From the determinants of the filing status to the actual lodgement methods of tax, the PRC learns directly from the US. This study therefore adopts the progressive[107] income tax rate.

The income tax rate adopted in this study is compatible with the tax rate prescribed in Article 3, *Individual Income Tax Law of the People's Republic of China.[108]*

For illustrative purposes, the progressive rate scale for wages and salary income is applied to the comprehensive income of all taxpayers.

Table 11 Monthly Marginal Income Tax Rate[109]

Taxable Income (RMB)	Tax Rate	Tax Payable (RMB)
0-1,500	3%	nil
1,501-4500	10%	45 + 10% of excess over 1,500
4,501-9,000	20%	345 + 20% of excess over 4,500

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[102] 《中华人民共和国个人所得税法》*Individual Income Tax Law of the People's Republic of China* 2011 (Standing Committee of the National People's Congress), Art 4.

[103]Meng X, 'Economic Restructuring and Income Inequality in Urban China' (2004) 50 *Review of Income and Wealth* (3) 357-379.

[104]Above n329.

[105]Goode R, *The Individual Income Tax*, (Brookings institution: 1964), at 541.

[106]Ibid.

[107]Ibid.

[108]Above n329.

[109]Adapted from 《中华人民共和国个人所得税法》 *Individual Income Tax Law of the People's Republic of China 2011* (Standing Committee of the National People's Congress), Art 1, para (1) sch 1.

9,001-35,000	25%	1,245 + 20% of excess over 9,000
35,001-55,000	30%	7,995 + 30% of excess over 35,000
55,001-80,000	35%	13,995 + 35% of excess over 55,000
Over 80,000	45%	22,745 + 45% of excess over 80,000

Table 11 presents the results of the progressive tax rate format. The income tax free threshold is RMB 3500[110] per month, thus for the amount of taxable income below RMB 3500, there is no income tax levied. Only members of 6 married pairs among the total 28 groups are required to pay individual income tax, namely:

- Family (3,7) with an average annual income of RMB 44,126.04 per member, and with an annual tax payable of RMB 63.72.
- Family (4,7) with an average annual income of RMB 47,204.4 per member, and with an annual tax payable of RMB 156.24.
- Family (5,7) with an average annual income of RMB 51,318 per member, and with an annual tax payable of RMB 279.72.
- Family (6,7) with an average annual income of RMB 56,674.2 per head, and with an annual tax payable of RMB 440.28.
- Family (6,6) with an average annual income of RMB 43,470.96 per head, and with an annual tax payable of RMB 44.28.
- Family (7,7) with an average annual income of RMB 69,877.32 per head, and with an annual tax payable of RMB 1527.6.

For the full calculations, see the footnote.[111]

The total amount of income tax for year 2012 equals to the annual income tax payable per member, multiplied by the number of people in the labour force in the urban area, which is 371.021 million[112] as reported by the National Bureau of China.

2.2.3.3 Calculation of Income Tax

The total amount of individual income tax revenue under the family filing approach in 2012 (TY) equals to the sum of all possible matched pairs' individual income tax amount. For each pair, the amount of total income tax revenue equals to the amount of annual income tax per head (Y.PP.), times the number of people in the labour force in the urban area (N), and then times the possibility (1/p) of the occurrence of a particular matched pair.

$$\text{Total income tax revenue under a family filing approach}$$
$$= \sum(annual\ average\ income\ tax\ amount\ per\ head\ per\ pair *$$
$$number\ of\ people\ in\ the\ labour\ force\ in\ the\ urban\ area * \frac{1}{number\ of\ all\ matched\ pairs})$$

$$\text{TY} = \sum(Y.PP).* N * \frac{1}{p}$$

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[110]Ibid.

[111]By applying the corresponding income tax rate, the amount of income tax payable per month was shown in the following chart. Times the income tax payable per month by 12 will get the annual income tax payable.

[112]National Bureau of Statistics of the People's Republic of China, <http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0403&sj=2014>.

In this research,

N=371.021 million

P=28

See Table 2.9 for the whole calculation procedure. Based on the calculation, the total income tax revenue for 2012 under a family-based filing estimation is RMB 332.8367bn,[113] which is approximately RMB332.84bn.

Table 12 Calculation of Total Individual Income Tax Under Family Filing Basis in 2012 (RMB)

Decile Groups	Per Capita Total Income of Urban Households (RMB)	Order ID	Marched Pairs	Family Member A Annual Income	Family Member B Annual Income	Sum of family annual Income	Average Annual Income per person	Income per month per person	Income Tax per month per person	Annual Income tax amount per person	Numbers of people in the labour force in the urban area (Million)	Total Income Tax (Million)	
Table 6.10 Calculation of Total Individual Income Tax Under Family Filing Basis in 2012 (RMB)
0-10%	9209.5	1	1,7	9209.5	69877.3	79086.8	39543.4	3295.2833	0	0	371.02	0	
10%-20%	13724.7	2	1,6	9209.5	43471	52680.5	26340.25	2195.0208	0	0	371.02	0	
20%-40%	18374.8	3	1,5	9209.5	32758.8	41968.3	20984.15	1748.6792	0	0	371.02	0	
40%-60%	24531.4	4	1,4	9209.5	24531.4	33740.9	16870.45	1405.8708	0	0	371.02	0	
60%-80%	32758.8	5	1,3	9209.5	18374.8	27584.3	13792.15	1149.3458	0	0	371.02	0	
80%-90%	43471	6	1,2	9209.5	13724.7	22934.2	11467.1	955.59167	0	0	371.02	0	
90%-100%	69877.3	7	1,1	9209.5	9209.5	18419	9209.5	767.45833	0	0	371.02	0	
			2,7	13724.7	69877.3	83602	41801	3483.4167	0	0	371.02	0	
			2,6	13724.7	43471	57195.7	28597.85	2383.1542	0	0	371.02	0	
			2,5	13724.7	32758.8	46483.5	23241.75	1936.8125	0	0	371.02	0	
			2,4	13724.7	24531.4	38256.1	19128.05	1594.0042	0	0	371.02	0	
			2,3	13724.7	18374.8	32099.5	16049.75	1337.4792	0	0	371.02	0	
			2,2	13724.7	13724.7	27449.4	13724.7	1143.725	0	0	371.02	0	
			3,7	18374.8	69877.3	88252.1	44126.05	3677.1708	5.31	63.72	371.02	23641.394	
			3,6	18374.8	43471	61845.8	30922.9	2576.9083	0	0	371.02	0	
			3,5	18374.8	32758.8	51133.6	25566.8	2130.5667	0	0	371.02	0	
			3,4	18374.8	24531.4	42906.2	21453.1	1787.7583	0	0	371.02	0	
			3,3	18374.8	18374.8	36749.6	18374.8	1531.2333	0	0	371.02	0	
			4,7	24531.4	69877.3	94408.7	47204.35	3933.6958	13.02	156.24	371.02	57968.165	
			4,6	24531.4	43471	68002.4	34001.2	2833.4333	0	0	371.02	0	
			4,5	24531.4	32758.8	57290.2	28645.1	2387.0917	0	0	371.02	0	
			4,4	24531.4	24531.4	49062.8	24531.4	2044.2833	0	0	371.02	0	
			5,6	32758.8	43471	76229.8	38114.9	3176.2417	0	0	371.02	0	
			5,7	32758.8	69877.3	102636.1	51318.05	4276.5042	23.31	279.72	371.02	103781.71	
			5,5	32758.8	32758.8	65517.6	32758.8	2729.9	0	0	371.02	0	
			6,7	43471	69877.3	113348.3	56674.15	4722.8458	36.69	440.28	371.02	163352.69	
			6,6	43471	43471	86942	43471	3622.5833	3.69	44.28	371.02	16428.766	
			7,7	69877.3	69877.3	139754.6	69877.3	5823.1083	127.3	1527.6	371.02	566770.15	
											Total Amount	33283.674	Million
												332.8367	Billion

Table 12 is the demonstration of the calculation procedures for the total individual income tax. For each family unit, the total national individual income tax revenue equals to the income tax payable per year for each individual times the total labour force in the urban area. Since there are 28 possible matched pairs of families, the possibility[114] for the occurrence of a certain matched pair is $\frac{1}{28}$, so the research multiplies the national income tax revenue for a particular family by $\frac{1}{28}$ after taking the said possibility into consideration. Finally, the research illustrates that only six hypothetical families are liable for individual income tax, and calculates the total individual income tax revenue under the family filing approach by summarising those 6 families' income tax payable and divides the result by 28.

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[113]Equivalent to AUD 70.53bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.
[114]Savage L, *The Foundations of Statistics*. (New York: Courier Corporation, 1972), at 142.

2.2.3.4 Calculation of the Inflated Value as in 2014

While Module One sets 2014 as the base year for future cash flows to be discounted to, statistics for Module Two is only updated to 2012. In order to prepare a clear comparison between the amount under the existing filing status and family-based status, it is necessary to inflate the amount of RMB332.84bn to the year of 2014. The same inflation method as Module One is applied.

1. Calculate the Growth Rate in 2012;

The formula used to calculate the GDP growth rate [GR] in 2012 is

$$[GR] = \frac{\triangle GDP}{GDP_{2011} \ (S.I.+T.I.)}$$

$$= \frac{GDP_{2012}(S.I.+T.I.) - GDP_{2011}(S.I.+T.I.)}{GDP_{2011} \ (S.I.+T.I.)}$$

Table 13 the Annual Gross National Income for Primary and Secondary Industries[115]

Database：Annual		
Year：LATEST10		
Indicators	2012	2011
Gross National Income(1billion)	539,116.5	484,753.2
Gross Domestic Product (1billion)	540,367.4	489,300.6
Value-added of the Primary Industry(1billion)	50,902.3	46,163.1
Value-added of the Secondary Industry (1billion)	244,643.3	227,038.8
Value-added of the Tertiary Industry (1billion)	244,821.9	216,098.6
Per Capita GDP(RMB)	40,007	36,403

Table 13 lists The Annual Gross National Income for Primary and Secondary industries.

Identify the GDP of secondary and tertiary industry for year 2011 and 2012.

The growth rate in 2012= The increase amount of GDP in secondary and tertiary industry from 2011 to 2012/ The amount of GDP in secondary and tertiary industry in 2011

$$[GR] = \frac{\triangle GDP}{GDP_{2011} \ (S.I.+T.I.)}$$

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[115]The National Bureau of Statistics of China, < http://www.stats.gov.cn/tjsj/>.

The GDP growth in the secondary and tertiary industries from 2011 to 2012 = (2012 secondary industry GDP+2012 tertiary industry GDP)-(2011 secondary industry GDP+2011 tertiary industry GDP)

$$\triangle GDP = GDP_{2012} \ (S.I. + T.I.) - GDP_{2011} \ (S.I. + T.I.)$$

The GDP growth in the secondary and tertiary industries ($\triangle GDP$) = (244,643.3+244,821.9)-(227,038.8+216,098.6) =RMB 46,327.8bn

2011 secondary industry GDP & 2011 tertiary industry GDP [GDP_{2011} (S.I. + T.I.)]=227,038.8+216,098.6= RMB 443,137.4bn

The growth rate in 2012[GR]= 46327.8/443137.4=0.104545

As a result, the growth rate for year 2012 is approximately 10.45%.

2. Apply the Growth Rate for the amount as in 2013

The research applied the growth rate[116] and calculates the estimated amount for 2013,

RMB332.84bn * (1+0.104545) = RMB367.64bn[117]

3. Calculate the Growth Rate in 2013

The formula used to calculate the GDP growth rate [GR] in 2013 is

$$[GR] = \frac{\triangle GDP}{GDP_{2012} \ (S.I.+ T.I.)}$$

$$== \frac{GDP_{2013}(S.I.+ T.I.) - GDP_{2012}(S.I.+T.I.)}{GDP_{2012} \ (S.I.+ T.I.)}$$

Table 14: the Annual Gross National Income for Primary and Secondary Industries[118]

Database：Annual Year：LATEST10		
Indicators	2013	2012
Gross National Income(RMB 1 billion)	590,422.4	539,116.5
Gross Domestic Product(RMB 1 billion)	595,244.4	540,367.4
Value-added of the Primary Industry(RMB 1 billion)	55,329.1	50,902.3
Value-added of the Secondary Industry(RMB 1 billion)	261,956.1	244,643.3
Value-added of the Tertiary Industry(RMB 1 billion)	277,959.3	244,821.9
Per Capita GDP(RMB)	43,852	40,007

Table 14 lists The Annual Gross National Income for Primary and Secondary industries.

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[116]Above n301.

[117]Equivalent to AUD 77.90bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016

[118]The National Bureau of Statistics of China, <http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0403&sj=2014>.

Identify the GDP of the secondary and tertiary industries for year 2012 and 2013.

The growth rate in 2013= The increase amount of GDP in secondary and tertiary industry from 2012 to 2013/ The amount of GDP in secondary and tertiary industry in 2012

$$[GR] = \frac{\triangle GDP}{GDP_{2012} \ (S.I.+ T.I.)}$$

The GDP growth of the secondary and tertiary industry from 2012 to 2013 = (2013 secondary industry GDP+2013 tertiary industry GDP)-(2012 secondary industry GDP+2012 tertiary industry GDP)

$$\triangle GDP = GDP_{2013} \ (S.I. + T.I.) - GDP_{2012} \ (S.I. + T.I.)$$

The increase amount of GDP in secondary and tertiary industry= (261,956.1+277,959.3) - (244,643.3+244,821.9) =RMB50450.2bn[119]

2012 secondary industry GDP & 2012 tertiary industry GDP $[GDP_{2012} \ (S.I. + T.I.)]$=244,643.3+244,821.9= RMB489465.2bn[120]

The growth rate in 2013[GR]= 50450.2/489465.2=0.103072

As a result, the growth rate for year 2012 is approximately 10.31%.

4. Apply the Growth Rate for the Amount as in 2014

The research applies the growth rate and calculates the estimated amount for 2014,

RMB 367.64bn * (1+0.103072) = RMB 405.53bn[121]

5. Apply the Average Growth Rate for the 10 year Forecast

The research then applies the average growth rate to calculate the forecasted value for the total individual income revenue as in year 2015 to 2024. The compound formula[122] to calculate the future value is listed as follows:

$P_n = P_0 (1+r)^n$
P_n is future value of P_0
P_0 is original amount invested
r is the rate of interest
n is the number of compounding periods (years, months, etc.)

In this research, P_0 is the initial amount of the forecast,

P_0 =RMB 405.53bn[123]

---

[119]Equivalent to AUD 10,090.04 (100 million), the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[120]Equivalent to AUD 97,893.04 (100 million), the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[121]Equivalent to AUD 85.93bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[122]Above n304.

[123]Equivalent to AUD 82.25bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

R is the average growth rate, **r**=0.084671[124]

The research substitutes 405.53 of **P₀** and calculates the corresponding forecasted future amount for each year. The results are reported in Table 2.12.

Table 15: Forecasted Individual Income Tax (RMB billion) from 2014 to 2024

Forecasted Individual Income Tax (RMB billion) from 2014 to 2024										
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Amount	405.53	439.87	477.11	517.51	561.33	608.85	660.41	716.32	776.97	842.76	914.12

Table 15 reports the results of forecasted individual income tax (RMB billion) from 2014 to 2024.

6. Discount the Forecasted Value to the Present Value

At this stage, the research applies the discount factor, as stated in previous section, of 7%[125] to calculate the present value for the estimated amount as in 2014.

The detailed calculation procedures are explained and demonstrated in the previous section, so this section only reports the results.

Table 16: Present Value of Individual Income Tax (RMB billion) from 2014 to 2024

Presented Value Individual Income Tax (RMB billion) from 2014 to 2024										
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Forecasted Amount	405.53	439.87	477.11	517.51	561.33	608.85	660.41	716.32	776.97	842.76	914.12
Discounted Amount	405.53	411.09	416.727	422.44	428.23	434.1	440.06	446.09	452.21	458.41	464.69
NPV											RMB: 4779.6Billion

Table 16 reports the results of presented individual income tax (RMB billion) from 2014 to 2024.The research adds the 10 values together to conclude the net present value. From the Table 6.14, the NPV under the family based filing approach is RMB 4779.6bn.[126]

2.2.4: Step 2 - Consideration of the Singles in the Population

Step 1 identified the net present value of total income for the 10-year-forecast based on the current under the current filing method and the family based filing method. It explained the key elements for the calculation under the two different bases. A further step is necessary to review the experiment design to improve the robustness of the research, as not all taxpayers are married.

The quantitative research is based on the assumption of the urban nuclear family in the PRC. For the calculation of total income tax revenue according to the current filing method, it has been assumed that the majority of individual income tax is in the urban area. For the family based filing approach, Step 1 only generated the model suitable for taxpayers who are part of a

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[124]Adapt from Step One.

[125]Above n291.

[126]Equivalent to AUD 1012.8bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

family, while ignoring the individual income tax lodgement for single individuals. One-person households[127] include singles, divorcees and widows. The estimation of the total individual income tax revenue based on family filing should also include one-person households.

2.2.4.1 Calculation of the Income Tax Revenue Levied on One-Person Households

The way for individuals belonging to the one-person households to lodge their individual income tax is the same as what taxpayers did under the current approaches.[128] After the taxpayers receive their taxable income, as they do not have other family members for tax purposes, they need to prepare their Individual Income Tax Return Form on an individual basis.[129] As the same lodgement approach is used for all taxpayers, the reported total national individual income tax revenue in 2014 is used for calculations, and the singles rate is also considered.

1. Calculation of the Singles Rate

The research collected the data from the National Bureau of PRC. The NBC selected a sample population size of 938,993[130] to account for people who are 15 and above. According to the definition from the OECD, the working age population[131] is defined as those aged 15 to 64.

This research takes into consideration the lower age limit of 15, but does not limit the income earning age to 64. The quantitative design aims to forecast the individual income tax levied on taxable income. Those individuals over 64 usually receive a pension[132] if they are part of an urban family in the PRC. Therefore, under the global income approach, the source of income from pension funds also need to be included in the taxable income.

Table 17: Three Types of Singles Population in the Sample Population[133]

Database：Annual Year：LATEST10	
Indicators	2014
Population Aged 15 and Over (Sample Survey)(person)	938,993
Male Population Aged 15 and Over (Sample Survey)(person)	475,585
Female Population Aged 15 and Over (Sample Survey)(person)	463,408
Population Aged 15 and Over, Never Married (Sample Survey)(person)	184,889
Male Population Aged 15 and Over, Never Married (Sample Survey)(person)	109,758
Female Population Aged 15 and Over, Never Married (Sample Survey)(person)	75,132
Population Aged 15 and Over, Divorced (Sample Survey)(person)	16,291

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[127]Yeung W and Cheung, AKL, 'Living Alone: One-Person Households in Asia' (2015) 32 *Demographic Research* (40) 1099-1112.

[128]Bakija J & Steuerle E, 'Individual Income Taxation since 1948.' (1991)44 *National Tax Journal* (4) 451-475.

[129]Ibid.

[130]The National Bureau of Statistics of China, <http://www.stats.gov.cn/?>.

[131]OECD Data, *Working Age Population,* Online <https://data.oecd.org/pop/working-age-population.htm> (08Aug.2016).

[132]《基本养老保险基金投资管理办法》*Measures for Administration of Basic Pension Insurance Fund Investment 2015* (State Council), Art 2.

[133]The National Bureau of Statistics of China, < http://www.stats.gov.cn/tjsj/>

Male Population Aged 15 and Over, Divorced (Sample Survey)(person)	9,508
Female Population Aged 15 and Over, Divorced (Sample Survey)(person)	6,783
Population Aged 15 and Over, Widowed (Sample Survey)(person)	50,409
Male Population Aged 15 and Over, Widowed (Sample Survey)(person)	15,064
Female Population Aged 15 and Over, Widowed (Sample Survey)(person)	35,345

Table 17 lists the amount of different types of singles population among the sample. There are three categories of one person households; among the sample population for people above 15, 184,890 were single and have never being married, taking up 19.7% of the total sample size; 16,291 were divorced but were not remarried, accounting for 1.73% of the total sample; and 50,409 have been widowed and were not remarried, accounting for 5.4% of the total sample. The research adds up the total number of people from the three groups and divides the amount by the total size to calculate the singles rate.

Total amount of single persons in the sample

184,890+16,291+50,409=251,590

Singles rate=Total number of single person/ Total population within the sample

Singles rate: 251,590/938,993=0.267936

The singles rate is approximately 26.8% in the PRC.

2. The Calculation Procedure

a. Calculation of Income Tax Revenue for the One-Person Households

Individual income tax revenue for the one-person household is calculated by applying the singles rate to the total individual income tax revenue in 2014. The same procedures have been adopted for the calculation of the forecasted amount in each year by inflating the amount of income tax revenue from 2014 to 2024 with the same growth rate as in step 1. After the calculation of the forecasted amount for the next 10 years, the research discounts those forecasted amount to the base year of 2014 using the given social discount rate of 7%. The total net present value of national income tax revenue for a one-person household is the sum of the ten net present values.

The formula[134] developed to calculate the total income tax revenue for singles is;

Total income tax revenue for singles (TYS) = Total income tax revenue (TY) * singles rate (S)

TYS = TY*S

The growth rate and discount rate applied in this step is exactly the same as the previous step, and the calculation procedures are the same, so step 2 only reports the result of the forecast.

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[134] Above n332.

In this research, the amount of total income revenue in 2014 is RMB 7,376.61bn. So the total income tax revenue for singles is RMB 1,976.459bn.[135]

Total income revenue in 2014 for singles = 7376.61* 0.267936 RMB 1976.459bn

Table 18: Present Value of Individual Income Tax (RMB billion) from 2014 to 2024 for Singles

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Forecasted Amount	1976.459	2143.808	2325.326	2522.214	2735.772	2967.413	3218.667	3491.194	3786.797	4107.429	4455.209
The present value	1976.459	2003.559	2031.03	2058.878	2087.107	2115.724	2144.733	2174.14	2203.95	2234.169	2264.802
NPV										23294.55bn	

The total net present value of income tax revenue for one-person households under the family based filing approach is RMB23294.55bn.[136]

b. Estimation of Income Tax Revenue for the Urban Nuclear Family

The calculation procedures are the same as step 1 except for the change in the number of people in the labour force in the urban area. Step 2 only includes married people for family revenue estimation.

This step subtracts the amount of one-person household from the total number of people in the urban labour force.

Number of married people in the labour force in urban area[137] ($N_{married}$) = Total population in the workforce in the urban area (N_{total}) * single rate in the urban area (S)

$N_{married}$ = 371.02*(1-0.267936) = 271.61(Million)

The calculation process for the estimated total individual income tax revenue is the same in this step compared with the previous step, except for the changing of the number of people in the labour force in the urban area from 371.02 (million) to 271.61 (million).

The calculation of the estimated amount of individual income tax for households under the family-based filing approach in 2012 is demonstrated in the following table.

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[135]Equivalent to AUD 395.29bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.
[136]Equivalent to AUD 4658.91bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.
[137]Above n332.

Table 19 Calculation of Total Individual Income Tax under Family Filing Approach in 2012(RMB) for Households

Calculation of Total Individual Income Tax under Family Filing Approach in 2012 (RMB) for Households												
Decile Groups	Per Capita Total Income of Urban Households (RMB)	Order ID	Marched Pairs	Family Member A Annual Income	Family Member B Annual Income	Sum of family annual Income	Average Annual Income per person	Income per month per person	Income Tax per month per person	Annual Income tax amount per person	Numbers of people in the labour force in the urban area (Million)	Total Income Tax (Million)
0-10%	9209.5	1	1,7	9209.5	69877.3	79086.8	39543.4	3295.2833	0	0	271.61	0
10%-20%	13724.7	2	1,6	9209.5	43471	52680.5	26340.25	2195.0208	0	0	271.61	0
20%-40%	18374.8	3	1,5	9209.5	32758.8	41968.3	20984.15	1748.6792	0	0	271.61	0
40%-60%	24531.4	4	1,4	9209.5	24531.4	33740.9	16870.45	1405.8708	0	0	271.61	0
60%-80%	32758.8	5	1,3	9209.5	18374.8	27584.3	13792.15	1149.3458	0	0	271.61	0
80%-90%	43471	6	1,2	9209.5	13724.7	22934.2	11467.1	955.59167	0	0	271.61	0
90%-100%	69877.3	7	1,1	9209.5	9209.5	18419	9209.5	767.45833	0	0	271.61	0
			2,7	13724.7	69877.3	83602	41801	3483.4167	0	0	271.61	0
			2,6	13724.7	43471	57195.7	28597.85	2383.1542	0	0	271.61	0
			2,5	13724.7	32758.8	46483.5	23241.75	1936.8125	0	0	271.61	0
			2,4	13724.7	24531.4	38256.1	19128.05	1594.0042	0	0	271.61	0
			2,3	13724.7	18374.8	32099.5	16049.75	1337.4792	0	0	271.61	0
			2,2	13724.7	13724.7	27449.4	13724.7	1143.725	0	0	271.61	0
			3,7	18374.8	69877.3	88252.1	44126.05	3677.1708	5.31	63.72	271.61	17306.989
			3,6	18374.8	43471	61845.8	30922.9	2576.9083	0	0	271.61	0
			3,5	18374.8	32758.8	51133.6	25566.8	2130.5667	0	0	271.61	0
			3,4	18374.8	24531.4	42906.2	21453.1	1787.7583	0	0	271.61	0
			3,3	18374.8	18374.8	36749.6	18374.8	1531.2333	0	0	271.61	0
			4,7	24531.4	69877.3	94408.7	47204.35	3933.6958	13.02	156.24	271.61	42436.346
			4,6	24531.4	43471	68002.4	34001.2	2833.4333	0	0	271.61	0
			4,5	24531.4	32758.8	57290.2	28645.1	2387.0917	0	0	271.61	0
			4,4	24531.4	24531.4	49062.8	24531.4	2044.2833	0	0	271.61	0
			5,6	32758.8	43471	76229.8	38114.9	3176.2417	0	0	271.61	0
			5,7	32758.8	69877.3	102636.1	51318.05	4276.5042	23.31	279.72	271.61	75974.749
			5,5	32758.8	32758.8	65517.6	32758.8	2729.9	0	0	271.61	0
			6,7	43471	69877.3	113348.3	56674.15	4722.8458	36.69	440.28	271.61	119584.45
			6,6	43471	43471	86942	43471	3622.5833	3.69	44.28	271.61	12026.891
			7,7	69877.3	69877.3	139754.6	69877.3	5823.1083	127.3	1527.6	271.61	414911.44
										Total Amount	24365.745 Million	
											243.66 Billion	

The research then inflates the total individual income tax for households from 2012 to 2014.

The growth rate of 10.45%[138] for income tax in year 2012 (calculated in previous section) is applied and the amount of income tax revenue for 2013 is calculated as follows:

$$243.66* (1+0.1045) = RMB\ 269.12bn^{139}$$

The amount for income tax revenue in 2013 for households is RMB 269.12bn.

The growth rate of 10.31%[140] for income tax in year 2013 (calculated in previous section) is applied and the amount of income tax revenue for 2014 is calculated as follows:

$$269.12*(1+0.1031) = RMB\ 296.87bn^{141}$$

The amount for income tax revenue in 2014 for households is RMB 296.87bn.

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[138]Adapted from Step One.

[139]Equivalent to AUD 57.03bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[140]Adapted from Step One.

[141]Equivalent to AUD 62.91bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

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The step further applies the growth rate of 8.47% and the discount rate of 7% to inflate the projected cash flows and then discount those cash flows to the base year.

Table 20: Present Value of Individual Income Tax (RMB billion) from 2014 to 2024 for Households

Presented Value Individual Income Tax (RMB billion) from 2014 to 2024 for Households.										
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Forecasted Amount	297	322	349	379	411	446	483	524	569	617	669
Present Value	297	300	305	309	313	318	322	327	331	336	340
NPV										RMB3499Billion	

Table 20 summarises the presented value of individual income tax from 2014 to 2024 for households.

c. Report the Final Results

Step 2 considers the income tax lodgement for the one-person households and the families. Based on previous calculation, the NPV of family based total income tax is RMB 3,499bn,[142] the NPV of one-person households' total income tax is RMB 23,294.55bn,[143] and the NPV of total individual income tax is RMB 26,793.55bn.[144]

2.2.5: Step 3 - Take Singles and Equal Random Sample into Account

After reviewing the previous two steps for the quantitative design, the issue of random sampling distribution[145] has been identified and will be addressed in this step.

For the measure of individual income tax revenue estimation according to family-based filing, the first and second step directly used the seven levels of annual income groups classified by the National Bureau of Statistics. When reviewing the measurement, the distribution of those seven income groups in the population is not equal. Group 1 represents the 10% of the population who earned the lowest annual income in the urban area; the second lowest earning group also takes up 10% of the total population. Groups 3, 4 and 5 occupies 20% of the total population, and Groups 6 and 7 are the two groups with the highest annual income, accounting for 10% of total population respectively. Since the proportion of Groups 3,4 and 5 earners are twice the number of individuals belonging to Groups 1,2,6 and 7, if a random person is selected from the total population, the probability for the person's income falling into Groups 3,4 and 5 is two times the probability of them falling into Groups 1,2,6 and 7.

In order to make the pair matching of couples randomly distributed, Step 3 for this research considers redistributing the family groups. Group 1 and 2 can be combined to form the new Group 1', accounting for 20% of the total population. The annual income for the new Group 1' is the average amount of the old group 1 and 2;

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[142]Equivalent to AUD 699.8bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[143]Equivalent to AUD 4658.91bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[144]Equivalent to AUD 5358.71bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[145]Wonnacott T & Wonnacott R, Introductory Statistics. (New York: Wiley, 1972), at 296.

$$(9209.5+13724.7)*0.5=\text{RMB } 1,1467.10$$

At the same time, combining group 6 and 7 to create the new Group 5', also allows it to account for 20% of the total population. The annual income for the new Group 5' is the average amount of the old groups 6 and 7;

$$(43471+69877.3)*0.5=\text{RMB } 5,6674.15$$

Now the newly arranged groups with their Per Capita Total Income and Order ID are shown in the following table.

Table 21 Ranking of Per Capita Total Income of Urban Households (Rearrangement)[146]

Decile Groups	Per Capita Total Income of Urban Households(yuan)	Order ID
Per Capita Total Income of Urban Households, Low Income Households(0-20%)(RMB)	11467.1	1'
Per Capita Total Income of Urban Households, Lower Middle Income Households(20%-40%)(RMB)	18374.8	3
Per Capita Total Income of Urban Households, Middle Income Households(40%-60%)(RMB)	24531.4	4
Per Capita Total Income of Urban Households, Upper Middle Income Households(60%-80%)(RMB)	32758.8	5
Per Capita Total Income of Urban Households, High Income Households(80%-100%)(RMB)	56674.15	5'

Table 21 lists the 5 rearranged income distribution groups with their own order ID.

Once the 5 groups are formed, the next step is to select any two individuals from those five groups to form a family. There are 25 potential combinations with an equal occurrence possibility.

Table 22 All Possible combinations among 5 different groups

All Possible combinations among 5 different groups				
1',5'				
1',5	3,5'			
1',4	3,5	4,5'		
1',3	3,4	4,5	5,5'	
1',1'	3,3	4,4	5,5	5',5'

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[146]National Bureau of Statistics of the People's Republic of China,
<http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0A0405&sj=2014>.

Table 22 is the summary of the possible combinations of the pair matching.

2.2.5.1 The Calculation Procedures

The other measurement methods and calculation procedures are exactly the same as Step 2 except for taking random distribution into account. Under the family based approach, for all of the 25 possible family combinations, Step 3 estimates the average family annual income per head and apply the corresponding tax rate to get the annual income tax amount per head. The research then multiplies the annual income tax per head by the total number of married people in the labour force in urban areas to calculate the total amount of income tax revenue. Step 3 also constructs the discounted cash flow method to calculate the total net present value of national individual income tax revenue.

Calculation Procedure under Random Distribution for Households

This section adopts the new arranged matched pairs and the corresponding Order ID and Per Capita total income. The full calculation is shown in Table 2.20.

Table 23: Total Individual Income Tax under Family Filing Approach in 2012 for Random Distribution

Table 4.20 Calculation of Total Individual Income Tax Under Family Filing Basis in 2012 (RMB) for Households Random															
Decile Groups	Per Capita Total Income of Urban Households (RMB)	Order ID	Marched Pairs	Family Member A Annual Income	Family Member B Annual Income	Sum of family annual Income	Average Annual Income per person	Income per month per person	Income Tax per month per person	Annual Income tax amount per person	Numbers of people in the labour force in the urban area (Million)	Total Income Tax (Million)			
0-20%	11467.1	1'	1',5'	11467.1	56674.15	68141.25	34070.625	2839.2188	0	0	271.61	0			
20%-40%	18374.8	3	1',5	11467.1	32758.8	44225.9	22112.95	1842.7458	0	0	271.61	0			
40%-60%	24531.4	4	1',4	11467.1	24531.4	35998.5	17999.25	1499.9375	0	0	271.61	0			
60%-80%	32758.8	5	1',3	11467.1	18374.8	29841.9	14920.95	1243.4125	0	0	271.61	0			
80%-100%	56674.15	5'	1',1'	11467.1	11467.1	22934.2	11467.1	955.59167	0	0	271.61	0			
			3,5'	18374.8	56674.15	75048.95	37524.475	3127.0396	0	0	271.61	0			
			3,5	18374.8	32758.8	51133.6	25566.8	2130.5667	0	0	271.61	0			
			3,4	18374.8	24531.4	42906.2	21453.1	1787.7583	0	0	271.61	0			
			3,3	18374.8	18374.8	36749.6	18374.8	1531.2333	0	0	271.61	0			
			4,5'	24531.4	56674.15	81205.55	40602.775	3383.5646	0	0	271.61	0			
			4,5	24531.4	32758.8	57290.2	28645.1	2387.0917	0	0	271.61	0			
			4,4	24531.4	24531.4	49062.8	24531.4	2044.2833	0	0	271.61	0			
			5,5'	32758.8	56674.15	89432.95	44716.475	3726.3729	6.78	81.36	271.61	22098.19			
			5,5	32758.8	32758.8	65517.6	32758.8	2729.9	0	0	271.61	0			
			5',5'	56674.15	56674.15	113348.3	56674.15	4722.8458	36.69	440.28	271.61	119584.45			
											RMB	9445.5094	Millon		
											RMB	94.46	Billion		

Table 23 is the demonstration of the calculation procedures about the total individual income tax amount in 2012. The amount is RMB 94.46bn.

The research inflates the amount to 2013:

$$94.46*(1+0.1045) = RMB\ 104.33bn$$

The research then inflates the amount to 2014:

$$104.33*(1+0.1031) = RMB\ 115.09bn[147]$$

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[147]Equivalent to AUD 24.39bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

Step 3 then compounds the amount of total income tax revenue for married taxpayers into the next 10 years and constructs the discounted cash flow analysis to work out the NPV of the national income tax revenue under a family based filing approach.

Table 24: Present Value of Individual Income Tax (RMB billion) from 2014 to 2024 for Households for Random Distribution

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Forecasted Amount	115.09	124.83	135.4	146.87	159.31	172.79	187.42	203.29	220.51	239.18	259.43
Present Value	115.09	116.67	118.27	119.889	121.53	123.2	124.89	126.6	128.34	130.1	131.88
NPV									RMB 1356.5billion		

Under the family-based filing approach for the randomly distributed matched pairs, the final step applies the singles rate to the total income tax revenue for 2014 to calculate the amount for a one-person household. There is no change between Step 2 and Step 3. The amount for the NPV of single households is RMB 23294.55bn,[148] and the amount for the NPV of households under family-based filing approach under the random distribution is RMB 1356.5bn. The total amount of net present value is RMB 24,651.05bn.

2.3 Discussion of the Results from the Pilot Study

2.3.1 Summary for the Pilot Study

Based on the results from Module 1 and Step 3 of Module 2, the forecasted value for the total individual income tax revenue under the existing income tax filing status is RMB 86,940.62bn,[149] whereas the amount under the family-based filing approach is RMB 24,651.05bn.[150] If the government undertakes the individual income tax reform, it will only receive approximately 28.4% of the total tax revenue compared with the of the current approach. There is a significant gap between the revenue before and after the changing of the filing approach. This means there is a breach of the principle of "revenue neutrality." The government will only provide the tax benefit to the taxpayers when the policy changes do not bring in a negative effect. From a revenue approach, it is not appropriate for the Chinese government changing its income tax filing method from individual based to family based.

2.3.2 Implementation of the "Revenue Neutrality" Criteria

"Revenue neutrality" is selected as the criteria to assess the appropriateness for the People's Republic of China (PRC) to consider family based individual income tax filing of income tax returns. Based on the "revenue neutrality" criteria, changes of the filing approach for individual income tax should not materially affect the national individual income tax revenue in the PRC. If, finally, there is a significant difference in the estimated amount of national income tax revenue under the family filing approach and the individual based approach, the significant revenue gap would breach the "revenue neutrality" criteria.

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[148]Equivalent to AUD 4658.91bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[149]Equivalent to AUD 17,388.12bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

[150]Equivalent to AUD 1475.32bn, the current exchange rate ratio between RMB and AUD is 5:1 as on 30 Sep.2016.

2.3.3 Results

Results from the pilot study reports that the projected revenue from allowing family based individual income tax filing would be at a level that is closer to 30% of revenue collectable if the PRC does not allow family based individual income tax filing. This result breaches the "revenue neutrality" criteria. This result suggests that policy makers in the PRC need to take careful considerations of costings before proceeding with the reform.

Apart from the administrative aspect, the research costed the administrative reform plan proposed by scholars who suggested the family-based filing approach. The amount of individual income tax liability relates to the vital interest of each individual. The change of filing approach should ideally result in a lower individual income tax burden for taxpayers after the reform. On the other hand, tax is the major source of government revenue.[151] From the results of the pilot study, the proposed reform plan will result in significant reduction in the national individual income tax revenue, which breaches the criteria of "revenue neutrality". When there is a substantial national revenue loss after a reform, and the reform process is very complex as considering a lot of demographic and fiscal issues, there is not enough motivation for taxation authorities to continue the reform.

2.4 Conclusion

A review of the literature shows that Chinese scholars and commentators suggest that the PRC could learn directly from the US, and adopt their global income tax system and allow family based filing of individual income tax returns. The literature does not provide reasons for this suggestion.

This paper reports results from a feasibility study to assess whether the PRC could adopt the suggestions proposed by the prevailing literature. The study is performed based on a "revenue neutrality"[152] analysis that compares projected revenue from existing policies, and that collectable if China allows family based individual income tax filing.

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[151]Thuronyi V, ed, *Tax Law Design and Drafting*, (Washington DC: International Monetary Fund, 1996), at 531.

[152]Bradford DF, *Taxation, Wealth, and Saving*. (Massachusetts: MIT Press, 2000), at 167.