

Personal Income Tax and Revenue Forecasting of North Cyprus

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Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the Degree of

Master of Science
in
Economics

Eastern Mediterranean University
February 2015
Gazimağusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

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ABSTRACT

This thesis investigates the income tax revenues and social security contributions that are generated from the taxation of individuals in the Turkish Republic of Northern Cyprus (TRNC). Income tax is one of the subset of taxes included in the direct tax system of North Cyprus. Forecasting the specific amount of revenue for a range of tax policies is one of the targets of this study. Actually high total tax revenue is arises from the high tax rate which cause the tax evasion by individuals. On the other hand, large deficit in the social security system is one of the issue of TRNC. Therefore, there is requirement to find the system which solve the deficit of current system and also cause more incentive for people to pay their income tax.

To achieve this, a number of steps are required to be taken. Firstly, the components of the personal income tax system such as the total allowances, statutory tax rates and income brackets which are assigned to each part of the chargeable income according to the tax law of TRNC are required to be considered. Secondly, it is required to build a tax calculation model that is based on these components and regulations. The third step is to find the best methodology to calculate the aggregate amount of taxes payable for each taxpayer according to their income distribution.

The calculation of tax liabilities in over 11,000 taxpayers both for the current tax system of TRNC and for the proposed changes in the structure are made in revenue tax system and also the rates of overall security contributions changed. At the end the outcomes of the model are analyzed both in the current and the proposed systems.

Accordingly, the best set of income tax and social security policies are recommended.

Keywords: Personal income tax, tax return, micro simulation, revenue, social security contribution.

ÖZ

Bu tez Kuzey Kıbrıs Türk Cumhuriyeti'nde yaşayan bireylerin vergilendirilmesinden ortaya çıkan gelir vergisi gelirleri ve sosyal güvenlik katkılarını araştırır. Gelir vergisi Kuzey Kıbrıs'ın direkt vergi sistemi içerisindeki alt dizi vergilerden birisidir. Bu çalışmanın amacı bir dizi vergi politikaları için belirli vergi miktarını tahmin etmektir. Yüksek vergi oranı bir yandan toplam gelir vergisini artırırken diğer yandan vergi kaçakçılığına sebep olmaktadır. Bunun yanısıra, sosyal güvenlik sisteminde ciddi miktardaki açık büyük bir problem teşkil etmektedir. Dolayısıyla hem mevcut açığa çare bulabilen, hem de bireylerin gelir vergi yükümlülüklerini ödemeye teşvik edecek bir sisteme ihtiyaç vardır. Bunu başarmak için birkaç adım atılması gerekmektedir. İlk önce gelir vergisi sisteminin toplam indirimler, meşru vergi oranları ve gelir destekleri gibi bileşenlerinin dikkate alınması gerekir. İkinci olarak, bu bileşen ve düzenlemelere dayanan bir vergi hesaplaması inşa etmek gereklidir. Üçüncü adım, her vergi mükellefinin gelir dağılımlarına göre ödenebilir bütün vergi miktarlarını hesaplayabilmek için en iyi metodolojiyi bulmaktır. 11000'den fazla vergi mükellefi arasında, hem KKTC'nin mevcut vergi sistemi ve yapıdaki önerilen değişiklikler için vergi borcu hesaplaması gelir vergi sistemi ve ayrıca değişen tüm güvenlik katkıları yapılmıştır. Bu yüzden iyi gelir vergisi dizileri ve sosyal güvenlik politikaları tavsiyesinde bulunulmuştur.

Anahtar Kelimeler: Kişisel gelir vergisi, vergi dönüşü, mikro benzeşme, gelir, sosyal güvenlik katkısı.

ACKNOWLEDGEMENT

First of all, special thanks to my thoroughbred and professional supervisor Prof. Dr Glenn P. Jenkins who supported and encouraged me, and special thanks to Assist. Prof. Dr. Kemal Bagzibagli for his guidance throughout the writing process of my master thesis. I am also thankful to Assoc. Prof. Dr. Mustafa Besim who always welcomed me whenever I had any difficulties in advancing the progress. I really appreciate Asst. Prof Hasan Altıok for his patience and help during my thesis process.

At the end I would like to thank Mr. Göksel Saydam for all the assistance that I have received from him.

To My Family

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LIST OF ABBREVIATIONS

PIT	Personal Income Tax
MS	Micro-Simulation
PAYE	Pay As You Earn
TRNC	Turkish Republic of Northern Cyprus
TL	Turkish Lira
SS	Social Security
ETR	Effective Tax Rate
GNP	Gross National Product
IES	Income and expenditure Services
SARS	South African Revenue Services

Chapter 1

INTRODUCTION

Revenue from taxation is one of the major approaches of the government. Indeed the government has sources of revenue which refer to tax revenue, non- tax revenue and grants. Payments and charges or royalties and hiring from public assets are expressed as a sample of non-tax revenue. The grant is usually the non-refundable amount of money or cash payments by the government to the people. Tax revenue is the volume of revenue that is generally obtained by the two types of taxes which are cited as direct taxes and indirect taxes. In particular, direct taxes are broken down into subgroups such as corporation income tax, personal income tax and property taxes.

The focus of this study is on the portion of the personal income tax in the aggregate amount of revenue. This thesis examines the process of revenue determination by the personal income tax in the TRNC for 2011. Actually, in this study the tax revenue is defined as the summation of the income taxes and the social security contribution. One of the issues of the country is the large amount of deficits in the social security system. For this reason, a new social security system has been designed where; underreported income automatically lowers future pension benefits. Therefore, to find out what type of revenue system that would give to individuals an incentive to report their incomes truthfully and pay a larger contribution to the social security system it is required to have a specific model to estimate the amount of tax liability (both income tax and social security contribution) for each taxpayer. In order to have

the appropriate model and find the final revenue of personal income taxation, some procedures must be applied. Each level of this process is explained as one chapter in this thesis. The definition of each chapter and its details are discussed as following;

Chapter 2 covers the background of this study and reviews the related research that has been performed in other countries. The background of this study refers to following subjects; the papers dealing with the same objectives for TRNC, the ones that determine the effects of the components of personal income tax system and the revenue impacts on of the tax system. It consists of the methods of calculating the tax liability and determines the detail of revenue forecasting for the tax system.

Chapter 3 defines all the details of the current tax system for the TRNC. This chapter includes all the tax law which is related to the personal income tax. These rules consist of every detail of the allowances, deduction, exemption, statutory rates and income bracket.

Chapter 4 determines the methodology which requires finding the tax liability and the effective tax rate for each taxpayer. The number of taxpayers that exist in the data of TRNC is 11177. Accordingly, the tax payable is required to be calculated for individuals. Thus, the best method in order to make this analysis is the micro-simulation technique. In addition, the base model to calculate the tax liability that is established by this thesis will be explained in this section.

Chapter 5 focuses on the outcomes of the base case in the current system of TRNC and the changes applied for the tax structure by simulation. Therefore, it compares the results of the current system and proposes changes in system and explains the

policy implication for the tax system after the simulation. Chapter 6 is the conclusion of this study.

Chapter 2

LITERATURE REVIEW

The most important source of government revenue for most countries is from taxation. The purpose of taxation is to finance government's expenditures. Other sources of revenue are referred to the non-tax revenue and grants. Grants are usually some form of foreign aid. Non-tax revenue can refer to such items as fees, user charger and dividends of state owned enterprises.

Given the social, economic and political inclination the tax systems of a state the tax system of the country will evolve to reflect these characteristics. (Musgrave. Richard A & Musgrave Peggy B. , 1989). The tax system consists of different types of taxes that can be divided into two subsets, direct and indirect taxes. This thesis is concerned with the revenue of the personal income tax system that is one element of direct taxation. The analysis of different tax policies on tax revenues will be carried out by using micro-simulation techniques. This chapter presents a survey of the literature on personal income taxation around the world. This literature is divided into three categories because there is an extensive literature related to this topic. These categories refer to the components of personal income tax, micro-simulation techniques and the revenue forecasting for a tax system.

2.1 Components of Personal Income Tax

Personal income tax is that part of the tax system that is levied on the individual components of the income of taxpayers. This tax system has components such as the

tax base, tax rates by income bracket, specific deductions and exemptions by which the amount of personal income tax will be determined.

One useful international study on the reform of the personal income tax system is for Denvil et al (2009). Use a panel dataset of PIT structure for 189 countries for a period of twenty five years between years of 1981 to 2005. This dataset includes all the required information such as tax credit and brackets, statutory rates, deductions and etc. Having such set of complete information provides a good information base for studies of the impact of changes in the PIT on the economic outcomes of countries. By using this dataset, it becomes possible to calculate the average and marginal rate of PIT for each level of income for each of these countries. Regarding the national income tax they found out some valuable results by the ordinary least square methods. In conclusion, Denvil et al. (2009) stated "that they found statistically significant positive association between tax rates and PIT collection in high income countries." Although in countries with a low degree of economic development this relatively may not hold.

Research has been performed by Ambrus (2012) that was related to the impacts of deductions on the personal income tax system. This research tried to find out how tax allowances play a role in the individual income tax. The objective was to understand the relative impacts that changes in the range of the tax brackets, allowances and tax rates had on tax revenues. One of the interesting conclusions of this study is that the lower income class of individuals benefits more from tax credits than from tax allowances. The opposite is the case for persons with higher incomes. One of the important highlights from this research refers to the situation which government decreases the tax burden. According to the tax system in the country, progressive or

flat one, various parameters are reduced. This study, for the Central and European countries, tries to simplify the tax system and decrease the tax burden by using a linear (flat) personal income tax. Whereas, the utilization of linear tax system has positive outcomes as a section of reorganizing the economic policy but some crises have forced some countries to return to using the progressive tax system. Therefore, in such crises the perceived progressivity of the tax system is much more important rather than what is actually the situation.

The main reference of this thesis is the paper published by Glenn P. Jenkins (2001). This paper would say that there is a need to reform the tax system of the TRNC and also decrease the theoretical development in the personal income tax. There is an ineffective tax structure in TRNC and also has a very high marginal tax rate. This study estimates the ratio of tax revenue to GNP in 2000 which was put TRNC among the higher taxed developing countries. Rather than this ratio did not consist of the social security contribution, provident fund.

As mentioned before, make the new system which can solve the issue of deficit in social security system of TRNC is one of the considerable objectives of this research. Accordingly can refer to the research of Jenkins & Altok (2012) did also to find the way to compensate the deficit of the social security system of TRNC. Thus they focused on the assessment of the differentiation of the future contributions and the pensions benefit. They have proved that is better to have the structural reform in the economy as the reasonable solution of this issue for TRNC.

One of the other targets of this thesis is referred to the simulation of a single statutory rate of flat tax system with basic allowances. In fact, rather than the progressive

system of taxation it just uses the flat tax rate for all income brackets. To be familiar with the flat tax rate system, it can be referred to the research of Hrbek (2008), which focused on reforming the flat tax system. This research represented the reform of flat personal income tax on tax evasion and defined the rates of personal income tax that are liable for the level of tax evasion. The results of reforming represent that the orifice between the consumption of family and their income will be reduced after the reform of PIT system. This reduction happens for the family with just one active person who is aware of decreasing of marginal tax rate after the reform and for the family without any experience adapting to new system takes time.

2.2 Micro-simulation Technique

A micro-simulation model is different from the other models in the way that it acts on single module in lieu on complex data. Those units are known as individual economic units in the social science. The micro-simulation model encompasses files that characterize the individuals, households, or trades as input database. A collection of legislations are applied to each individual file by the simulation model. The quantity of levy owed by the module or the dollar amount of profit to which the module is rightful under a government schedule, might form the result of the computations. Each single outcome is multiplied by whatever the weight is attached to the module in the micro data file and then the aggregate result is generated by adding the weighted single outcomes together. Some authors (Decancq 2012) put forth of that there are two categories of microeconomic models. These are the standard simulation models which simulate just one micro-unit then report the class of micro-units and the micro-simulation models. Alternatively the model can simulate all the micro-units of the population by the contradiction-section sample at the specific moment in time.

Thus, micro-simulation method is the proper technique to find the volume of personal income tax for each individual because of considering every details of taxpayer's behavior. (Schomen, 2010) have argued that the micro-simulation (MS) model is the best instrument to simulate all the effects of the current tax system and the new tax policies in the economics community. The mentioned paper tried to appraisal the tax revenue for each individual but the challenge is finding the model. The best model is the one that represents all the differentiation of taxpayer behavior with class of income for them and also consider the economic environment in order to replicate the original economic situation. N. Schoeman uses two types of data in order to make the best model of revenue forecasting. The data used in this paper comes from two sources; one of them is in the form of a survey which is the Income and Expenditure survey of 2005/2006 and the other one is the administrative data from the South African Revenue Services. SARS include the actual data and IES consists of data which is the base of micro-simulated model. Then the calculator model based on these data is created in order to estimate the tax liability of taxpayers and the revenue of the government at the end. After the utilization of MS model, the results are compared to the original data of SARS. The comparison derived that "the MS model is a valid model and can be used to simulate different tax policy scenarios." The other case which concluded during this simulation is that the tax liability decreases for the taxpayer with the lower income brackets.

The methodology of this thesis is similar to the constitutive components approach applied by Rohaly (2005). The Urban-Brookings micro-simulation is the tax model which is written by them. This is the specific model with the strong design for analyzing the tax policy. This model has lots of similarities with this thesis related to the process and components of measuring the tax payable by households. This model

has the particular calculator to find the tax liability of taxpayer under the current system of US and the propose policy. During the process of calculation the effect of marginal tax rate on the distribution of income can be shown. This model also assesses the revenue in the current system and after changing the policy. So, it consists of all the changes and the differentiation of the tax system for any various alternatives. Thus, any impacts of taxation for economic treatment can be represented basing on the utilization of this model.

2.3 Revenue Forecasting

The revenue forecasting in this thesis is referred to methods which can estimate the revenue obtained from the personal income taxation. The estimation methods may vary among the countries and their regulations. The availability of data for each region or country is a key factor which affects the revenue estimation method.

One example of revenue forecasting across different regions is the research done by Creedy (2011). This paper discusses how revenue can be apportioned into central and local governments. The author examines and defines the total personal income tax acquired from the tax system based on the combination design and separated into many regions. The distribution of the chargeable income for each area can define the aggregate amount of revenue for that region. In the following process, the distribution of chargeable income is made for each regional grouping of taxpayers and the sum of chargeable income in each income bracket will achieve the aggregate revenue for every region.

Chapter 3

CURRENT TAX SYSTEM IN THE TRNC

This chapter depicts the tax system govern in TRNC. The system consists of all the rules that are related to detail of the amounts, and statutory rates for personal income tax and the revenue come from it. According to TRNC law all the residents of Northern Cyprus are subject to income tax. This country has the progressive tax system. It means that individuals with the higher level of income are responsible to pay large percentage of tax than the ones that have lower income. In other words, the system of taxation in TRNC is in such a way that the aggregate amount of tax liability is completely related to the quantity of income earned by the individual. Indeed, there are many other factors which have effect the tax liability amount, such as the allowances, and exemptions, etc. For example, allowances applied to taxpayers during the process of measuring tax liability would decrease the amount of tax payable for them. That is to say, by knowing the existence of different factors which affect the tax liability, the most important one is the quantity of income earned by persons as the base of calculation for the tax payable. This chapter aims to explain all the details of regulation of personal income tax that is based on TRNC law.

3.1 Allowances

The nature of allowances is a way of reducing the effect of tax for every taxpayer. Some of them have more impacts and the other ones have less which depends on the detail of the personal information and the amount of income for every taxpayer.

Deductions must concede to taxpayer according to the personal income tax law of TRNC before the income tax is charged. In fact, personal income tax system makes the particular plan to have options in order to pay the tax personally or as the family. It means that there are many techniques as the family tax system which has the usual aspects such as levying tax liability according to the number of family member and total income of members would cause tax fees in downward progressivity trend. The family tax system has many advantages and it would be reasonable to have disadvantages. One of the disadvantages is the need of registration and also the extremely complicated rules. By considering all these points, it can be said that TRNC uses the allowances for each aspect of being as parts of the family; if one person is one of the family members according to his/her condition, such as having occupation or not, being in what marital situation, if married or widow, has children or does not make different amount of allowance for him/herself.

The tax law of TRNC determined a wide range of allowances with specific rates. This range consists of many types of deductions such as personal, special, wife, children, disability, old age and social contribution (social security plus provident fund) allowances. Some of these deductions are applied to the significant number of individuals and many of them are less common for taxpayers.

This study just focuses on the five categories of these allowances which are special, personal, marriage, children and social contribution allowances. This is due to the fact that the data available for 2011 does not have complete details of taxpayers such as age, disability and etc. On the other hand, these allowances have much more impact on the amount of tax liability of individual and also on the effective tax rate.

As a matter of fact, the effect of these five groups directly can be seen on the tax payable of each taxpayer. Each of these is described in details as follow.

3.1.1 Personal Allowances

Personal allowance is approximately granted to the major numbers of residents or for those who live in North Cyprus and have income. Indeed the condition of granting this allowance to the individual is not much as the other allowances. The taxpayer just should be one of the residents of TRNC. Therefore, the average amount of this allowance for total taxpayer is more than for the other deductions. Personal allowances are defined at the beginning of the calendar year and concede to the taxpayer by the Council of Minister. It means that the base of this allowance is afforded yearly. This deduction is measured by the formula which is based on the minimum wages and the salaries of individuals. This calculation can be shown as the Equation 1. as Personal Allowance :

$$\text{personal allowance} = (12 \times \text{minimum wage}) - (0.17 \times 12 \times \text{minimum wage}) \quad (1)$$

By considering that this study works on the tax payable of 2011, the amount of minimum wage for this year is 1,300.00 TL monthly. The 17 percent is the special allowance of the wage and lump sum taxation which should be subtracted from the whole amount of salary. This equation measures the amount of personal allowance equal to 12,948 TL annually. It means that 1,079 TL is the monthly amount of personal allowances allocated to the resident of TRNC in 2011.

Thus the personal allowance is a deduction regulates at origin by TRNC and is not contending by taxpayers. As a matter of fact, the idea of concerning might rise the correct measurement of tax code raised by individuals.

3.1.2 Special Allowances

One of the other sorts of allowance is the special allowance. According to the definition of allowances which lead to reduce the amount of tax liability for individuals, this deduction has same impacts on the payable tax. Special allowance that it might be named as the earned income allowance would impact in two ways. The first one is the deduction allocated to the wages and it is the part of entire amount of taxation. The second one is the special allowances of each volume of costs after the subtraction of social security contribution. These two parts are expressed in the tax law of TRNC as the percentage of gross earning. The former is 17 percent and the later one is 10 percent. Therefore, the quantity of these two parts must be 17 and 10 percent of gross earning which are different for each taxpayer. In addition, gross earning is obtained from gross income minus social contribution. In view of the fact this study shows attention to the quantity of tax payable and the effective tax rate of each person and volume of the costs are not too much important in this study. Thus, this research just focuses on the first part of this allowance and uses it in the calculation. Consequently just 17 percent of gross earning is used as the special allowance.

3.1.3 Marriage Allowances

The marriage allowance is applied to every taxpayer who is married. That is to say, the marriage deduction is completely related to the marital situation of individuals. It means that if the taxpayer is married s/he can get this allowance otherwise s/he cannot take it. This allowance has some conditions similar to the other deductions. The conditions term directly depends on the situation of living of the wife and spouse with each other. If wife and spouse are living together they can take different amounts rather than they are separated from each other. The marriage allowance is

defined as the percentage of the personal allowance as the other deductions. If the taxpayer is married or has civil partnership, the person can take 8 percent of the personal allowance. The amount is granted to taxpayer in this situation, which is equal to 1,035.8 TL. The other case is regarded to the taxpayer who is divorced or they are living separately. In this case, taxpayer will take 6 percent of personal allowance which is equal to 517.9 TL. To sum up, if the taxpayer is married, relative to the status of living with his/her wife/spouse will take one of these allowances. On the other hand, when the taxpayer is not married; s/he cannot take any money as the marriage allowance.

3.1.4 Children Allowances

The children allowance is one of the tax allowances that make less amount of tax liability. This deduction is granted to individuals according to some specific regulations. These regulations can be determined as the individual condition of children which consists of level of education and the age of children. Indeed, according to the details of these conditions, the quantity of deductions is different. As a matter of fact the personal information of children defines the amount of allowances which applied to each taxpayer. In actuality these information are classified in five groups. Each group has specific rate which is also the percentage of the personal allowance which are as follows:

a. First category is assigned to those taxpayers with unmarried children who are in primary education. The children of this group do not have any income. The age of children is 16 years old at the beginning of that year. The percentage of this group among the total children allowance is 6. That is to say, the 6 percent of personal allowance is granted to the first category of children. According to the amount of personal allowance, 776.9 TL is dedicated as the quantity of this group.

b. Second category is assigned to children with unmarried children who are less than 20 years old. They have fulltime education at the secondary school or are an officer on military services. The percentage given to this class is 8 percent of personal allowance. Therefore, 1035.8 is the appropriate amount that is calculated for this group.

c. Third category is allocated to taxpayers who have children having fulltime education at higher institute. The age of them must be between 18 and 27 years old. The accurate rate for this group is 11 percent of personal allowance. This quantity is equal to 1,424.3 TL for taxpayer.

d. Fourth class of children allowance is granted to taxpayers for the third child. Simply for taxpayers who have three children or more, there is specific deduction just for the third one of them. The percentage for the third child is 15 percent of the personal allowance that is 1,942.2 TL.

e. The last category is assigned to taxpayers who have more than three children. There is specific amount for each child after the third one. The determined rate is 5 percent of the personal allowance. A defined amount is 647.4 for this group. It means that if there are taxpayers that have 5 children, two of them are under this category and the quantity specified from this class is 1,294.8.

The idea of the children allowance for every taxpayer completely related to the number of children. According to the number of children, the aggregate value of children allowance is the summation of the total categories. This question may raise that; how one can find out the amount which defines the number of children? The

question will be answered in the next chapter and explain how one can justify the categories of children. This chapter just investigates the detail of the current tax system, not how to achieve this information.

3.1.5 Social contribution

The social contribution is the taxpayer's contribution which refers to the social security and provident fund. Other types of fund can be included in this contribution that the council of minister of TRNC has permitted to be allowed as an income deduction. Everyone who is working in North Cyprus will be covered under the social insurance plan as one of two employed or an individual self-employed. Therefore, generally social security cannot be afforded by foreigners and they should not expect to have the extent of support as same as the TRNC residents. Each taxpayer has some wages that is considered as the social contribution's payment. This payment is assumed as the base for the social security system. As a matter of fact the social contribution as one of the revenue sorts is acquired for the central financial scheme. Just two kinds of social contribution are considered in this study; social security and provident fund. As mentioned above, these amounts are subject to the specific quantity of wages of individuals. According to the tax regulation of TRNC, this amount is expressed as the percentage of wages and salaries as taxpayer income. The amount of social contributions is different for each taxpayer because of the different quantity of their salaries. The aggregate sum of the social contribution of TRNC is 13 percent of wages for each taxpayer. This percentage is divided into two parts of social security with 9% and provident fund with 4% of wage. The measured social contributions are deducted from income before calculation of the tax liability. Therefore, it is one of the types of allowances which make less amount of tax payable for the taxpayer.

3.1.6 Standard Tax relief

The basic credit of tax relief is zero for North Cyprus.

3.2 Income Bracket

Making the distribution model of different level of income is useful in its nature. One of the importances is that it is basically assigned to achieve the complete information from different level of income in any time. It can assist the decision maker in order to find the best policy among those that exist and the ones that are purposed. Another reason is the simplicity of each income level in various systems such as the tax system. For instance, the existence rate is relatively related to each income bracket of taxpayers in the progressive tax system. Thus, what is important is the distribution of income and the tax liability according to this distribution not only the total amount of income and tax payable. The following section expresses these income brackets with relative rate.

3.2.1 Marginal Tax Rate of Personal Income Tax

According to the regulation govern in each country, the marginal tax rate for taxable income is specific. This regulation comes from the law of each government that includes the set of allowances, the deduction and also the exemption. The differences exist in the set of allowances and exemptions that are expressed as the portion of purpose of taxable income. There are small numbers of individuals who have high level of income and because of this they cannot create lots of revenue. Therefore, there is reduction in the efficacy of high marginal rate (Zolt, & Bird, 2005).

According to tax law of TRNC there are income brackets which they have particular marginal rate for themselves and its details are expressed below.

3.2.2 Taxable Income

Income tax is levied on the chargeable income for each taxpayer. In addition, chargeable income is generally defined as the gross receipts or in other words when subtracting all the deductions, exemption and all other adjustment would arrive to chargeable income. Chargeable income is generated from all the income categories such as the commerce income, self-employed, rent, interest, dividend, and other types of income. Taxable income is levied on the chargeable income for each taxpayer. The total income that comes from these sources is taxed in different levels and different rates. The Personal income tax bracket and their rates which are applied to individual for 2011 are given in Table1.

Table 1. Income tax brackets and rates

Income Tax Bracket	Tax Rate	Incremental Tax	Total Tax
0-3000	10%	300	300
3000-6000	20%	600	900
6000-13600	25%	1900	2800
13600-23650	30%	3015	5815
Above 23650	37%		

It means that there are five income brackets and statutory rates applied for each taxpayer. The amount of each income bracket must be calculated according to the annual chargeable income of individuals. That is to say, the mentioned annual chargeable income of persons' breaks down into these five groups in order to assess the tax liability. The process is as follows; for the first 3000 TL of the income, the rate must be 10 percent, for the second 3000 TL of income the statutory rate is 20 percent. The third category is the 7600 TL of income with the rate of 25 percent. The fourth one is assigned to 10050 TL of income with the legal rate of 30 percent and it

remains the rate of 37 percent for the amount of income that is above the 23650 TL. There is not any necessity to be covered. All the income brackets by the chargeable income of taxpayer completely depend on the amount of chargeable income. For example, if the annual chargeable income of taxpayer is 22000 TL, the tax liability for this person is calculated as shown in Table 2.

Table 2. Sample of calculation of tax liability

Income Tax bracket	Rate	Tax Liability
3000	10%	300
3000	20%	600
7600	25%	1900
8400	30%	2520
0	37%	0
Total : 22000		Total: 5320

This table shows that the 22000 TL is divided into 4 groups of income bracket which the last bracket is just 8400 TL of 22000 TL. Therefore, there is not any amount as the fifth bracket with the 37 percent. According to the annual chargeable income of this taxpayer, s/he should pay 5320 TL as the tax liability. So, the tax liability of individuals is completely different by considering the amount of income they have and definitely are different numbers. It can cover all the income brackets or even one of them.

3.3 Revenue from PIT

The personal income tax creates one of the main parts of the revenue for TRNC. Indeed, the significant section of this income tax is the tax levied on the wages and

salaries which it is different according to the job opportunity of people in the TRNC. The base of personal income tax is constructed on the progressive tax system. It means that the bigger tax rate will follow the higher level of the taxable income. Therefore, it brings the people to wait for the equivalent effects of the distribution of income.

Macroeconomic models have some assumption with particular bases such as the rate of inflation, real growth rate and many other macroeconomic parameters which are various. In addition, these assumptions will make the structure of the revenue forecasting and budget expenses. Any changes of them will cause some effects on revenue which are very important because this revenue of taxation show the bulk of the economic activity.

Tax revenue is forecasted by different procedures such as Tax Elasticity (buoyancy), Model-Based approach, Effective Tax Rate, and the last one is the combination of both Tax elasticity and effective tax rate which is the contingent approach. The condition of the last method is this; to measure the revenue must apply other variable to utilize the former information. A question may arise that which methods are the appropriate ones? The answer is that the best way to find the good approach depends on the data. Simply the following should be checked; according to data what is the recommended method, sources of data, its availability and quality of it. Then choose the best ones. The method used in this study for forecasting the revenue is the Effective Tax Rate (ETR). The calculation of Effective Tax Rate is showed in Equation 2. as follows:

$$\text{Effective Tax Rate} = \frac{\text{Income Tax}}{\text{Net Income Before Taxes}} \quad (2)$$

As mentioned before, this study works on the personal income taxation and there are five income brackets for each taxpayer. Therefore, the income tax is defined as all the total tax paid according to the brackets and rates by each taxpayer and the net income before taxes is the wages and salaries for individuals in the data of this study. By calculating this rate, one can analyze how much each person should pay when compared to his/her wages.

As it is known, the revenue from the taxation crisis in their fiscal aspect of tax analysis and revenue forecasting have become increasingly important functions as governments undertake reforms of their tax systems to enhance the revenues, improve the equity and efficiency of taxes, and promote the economic growth.

Chapter 4

METHODOLOGY

Previous chapter reviewed the law of TRNC related to the personal income taxation. According to the law and tax system of this country there is a requirement to make the model. This study recognizes what model might be required to find the tax liability in a simple way. Thus, the model was built to help to measure the exact quantity of tax that must be paid by the residents of TRNC according to their income. Definitely each model has some outputs as the results are important for the researcher. The outputs of the model are the amount of tax payable and effective tax rate according to income. To be sure, just one range of output is not important. What is valuable in this study is that by changing the input of the model of how the output will change and in which scale will it be. Therefore, there is a necessity to find the method which can show all the details of inputs and outputs before and after the change. Hence distinguishing all the effects of factors of the personal income taxation both during the process and also for result is considered. So, the method is the most important part to obtain the best results. This chapter completely explains all parts of the model in detail and the method is accurate to consider the aim of this study.

4.1 Introduction to Micro-simulation Techniques

From the statistical analysis, there are two types of macroeconomic and micro-simulation models. Micro-simulation models use the single unit for its analysis such as individual, firm or a household, whereas the aggregate information consists of

total exports, imports and etc. Micro-simulation is needed to the details of the behavior and the focus is on the individual level to find out the problem from the persons perspective. The view of macroeconomic model is involved in the economy of the whole country and used the analytical tools for the instance regression. For example, micro-simulation model would examine the imports of one firm but the macroeconomic model analyzes the imports of whole imports in the particular economy. Therefore, both macroeconomic and micro-simulation models could show the effects of each policy on the distribution of income.

This research focuses on the micro-simulation technique as the method of analyzing. One of most important advantages of the micro-simulation rather than other techniques is that modeling with this method is in the line which affects the policy such as public pension and also other aspects of public finance. Among the functions of micro-simulation model which related to taxation can be mentioned as defining and analyzing the tax liability of each taxpayer. Assisting the micro-simulation models in order to calculate the revenue of the personal income tax according to the current tax system and even within the contemplate changes in tax policy is another valuable function of this method. If there is any necessity to change the policy in order to achieve the better economy position, who would be the winner/loser in both old and proposal policy situation? Therefore, it seems to be a powerful tool for these kinds of analysis.

As regards, each method has some difficulties. This principle is true for the micro-simulation technique. Micro-simulation models require every detail of the actions and these are huge samples. Therefore, easy accessibility of the data is not for the analyst. This tax information is generally the administrative ones or the data which

are collected by the government agencies. The quality of data is not always very good because of the limited number of these agencies. In order to have the best results of the model, one must be sure about the data entered for micro-simulation is accurate. The data used in this research come from the reliable government agency of TRNC. Thus there is not any wrong information here and they are the valuable ones.

4.2 Data

This part explains the available data of TRNC from different perspectives which is divided into two parts as the following; the detail of the personal income tax and the development of database used in this study.

4.2.1 Details of the Personal Income Taxation

Personal income tax is the tax levied on income of each person after subtracting all the deductions and the exemption. Obviously, the system of taxation is one of the significant parts of each type of taxation including the personal income tax. The tax system for TRNC is not flat tax system with one rate for all the income brackets. The progressive system of taxation is assigned for this country which the person with higher level of income has to pay more tax rather than the person with lower income. As reviewed in Chapter 3, the statutory tax rates are variable between 10 to 37 percent relative to the income brackets.

One of the components of personal income tax that makes less amount of gross income for taxpayer is the social contribution. This contribution includes provident fund and the social security that are subtracted from the gross income. Another element of the personal income tax is the allowances allocated to the taxpayer. After subtracting the social contribution from gross income, the allowances must be

deducted from the gross income which is obtained by a chargeable income of each taxpayer.

As mentioned in Chapter 3, social contribution is defined as the percentage of individual's income. Therefore, the issue is considered in this section is the detail of the income for the taxpayer. According to the data available for North Cyprus, the income of taxpayer is specified as the wages and salaries of the residents. In other words, the wages of taxpayer is the aggregate sum of different types of income for them. Wages of taxpayers consist of the combination of many kinds of income such as the commerce income, self-employed, on payroll employees, rent and similar income, interest and dividend, agriculture and other income. It implies that the wage can be mixed of one, two, and three or might be the summation of most of them. Surely there is not any necessity to be aggregate amount of all of them. The issue of each sort of income is included in wages or not completely depends on the occupation of each taxpayer. Among all these taxpayers in TRNC might be that some of them have just one or two kinds of income but there are many that have more than three sources of earning. Even there are individuals in the data without any income. Therefore, according to the amount of income the quantity of tax liability is different for the residents.

As a matter of fact the tax payable will be defined under many conditions that must be regarded. For the reason that this type of taxation is applied on individual income, in addition of allowances, relatively are related to the details of personal information of taxpayers. All these information are considered as the subsets which consequently make the aggregate amount of tax liability. The classification of these subdivisions is determined in this part. One part is referred to the personal information of taxpayer

such as the marital status and the number of children. The way of the determination of this specific information that is clarified in Section 4.3 is referred to the model explanation. It might be asked of how it can be found out that each taxpayer is married, single or widow or what is the number of children for each of them? This question will be answered in the next section (4.3; definition of model). The information is important because according to them it becomes possible to distinguish how much deduction is allocated to the taxpayer.

4.2.2 Expansion of Database

In order to figure out the process of data creation, it is better to know that micro-simulation model is a good way to show the tax policy to individual by particular samples. Based on the way of micro-simulation technique, which is work on the micro-units of databases of the taxpayer, it can make calculation of the impacts of the recommended changes in government's economy plan. Therefore, the impacts of current and recommended plan on people would be shown by the definition of the individual database. The data used in the micro-simulation model generally comes from the annual surveys which are collected by the government agencies. These inputs are generally the stratified sample of the database. The stratification in this research are as the following; first; origin of income, second; tax income ranging. In the database used in this research the source of income refers to the wages and salaries. These wages are broken down to the commerce income, self-employed, on payroll employees, rent and similar, interest and dividend, agriculture income and other income.

In fact all data for the residents of TRNC which related to taxation are taken from the government agency. These data are all the types of existence income for taxpayer, different kinds of tax (professional tax, tax for dividend income, tax on payroll and

etc.), social contribution (provident fund, pension contribution, social security, life insurance), aggregate sum of personal deduction, child exemption and total tax collected and tax liability. The data is just available as the number without any calculation or the process of measuring them. The aim of this research is to make the model to achieve the original amount with every detail by just having the tax law of TRNC as a basic guide.

The Database which is made by this research consists of personal information of the taxpayer such as marital status, number of children, deductions, process of calculating all the gross earning, chargeable income, and tax payable in both progressive tax system and flat tax rate. Considering every detail of the data included in the database, the process of finding the tax payable completely will be explained in the model section (4.3) of this chapter which refers to the calculator. Generally most of these calculations are completely determined in detail in the calculator of the model but two parts of personal information might require more explanation. Knowing the marital status and the number of children of each taxpayer are the ones that need some special calculation which can be explained in the part of the database.

The first issue is the way of finding the number of children for each taxpayer. In fact, the number of children is important by itself because it determines how much of children allowance will be granted to each taxpayer. According to the child exemption of the original data and the specific rates given in the tax law of TRNC, this research formulated the formula to find the number of children for the taxpayer. The other subject is the marital status of the taxpayer. As mentioned before in Chapter 3, all the relative deduction which can be used in this model and related to the personal information is classified in four groups. Then in order to know the total

deduction from original data and calculating the personal, special and children allowances under tax law, the allowances of marriage can be defined. Consequently, the marital status (married, widow or single) of each taxpayer can be distinguished by matching the amount of marriage allowance allocated to individuals.

4.3 Model

There is a requirement to find the model which can estimate the tax liability of each taxpayer according to the personal information of the individuals. As it is mentioned, the goal of this research is to discover the results of the tax liability of individuals under the current tax system and compare it with the proposed tax policy for the same taxpayer. Therefore, it chooses the typical taxpayer model to achieve accurate results through the situations of taxpayers. For instance, there are middle-aged people who are single, young persons who are married and have child, a couple without children.

In order to have the best results, simplified tax model is analyzed into four categories:

- | | |
|--------------------------------------|---------------|
| a) Parameters of personal income tax | b) Calculator |
| c) Lookup | d) Results |

This model studies the data in excel so each categories are worked on one excel sheet separately.

4.3.1 Parameters of Personal Income Tax

This section provides detailed information of taxpayer. Practically all the parameters came from the TRNC tax law which reviewed in Chapter 3. This section just requires those parameters that can be used in the specific model of the study and its part such as the calculator and the database. The certain parameters consist of the amount of

personal allowance, the percentage of deductions and the size of each one, the statutory tax rate and relative income bracket of them. To simplify the use of the calculator in next part, the parameters of personal income tax can be shown as the list in Table 3 as below:

Table 3. Personal Income Tax Parameters (2011)

Parameters	Rate	value
Standard Personal Tax Relief	-	0
Minimum Wage (monthly)	-	1300
Personal Allowance	-	12948
Special Allowance (wage and lump sum taxation)	17%	-
Marriage allowance (living together)	8%	1035.8
Marriage allowance (living separately or divorced)	4%	517.9
Children allowance :		
Unmarried child, <16 yrs old, primary education, without any income	6%	776.9
Unmarried child, <20 yrs old, 2th school or officer on military service	8%	1035.8
Children with 18<age<27, fulltime education at higher institute	11%	1424.3
Taxpayer would receive for third child	15%	1942.2
Taxpayer would receive more than three children	5%	647.4
Social Security Of Salary Income	9%	
Provident Fund Of salary Income	4%	

The table above shows the deduction granted to each taxpayer according to personal information of them, such as marital status, number of children with their age and level of education and at the end the social contribution afforded to the individual. Parameters that are required to measure the tax payable are not limited just to Table 3. There are some tax rates and income bracket which is reviewed in Chapter 3, but they must be shown here as the important part of parameter.

Table 4. Standard PAYE Tax Rate Applied to Chargeable Taxed Income

Standard PAYE Detail	Bracket (monthly)	Bracket (Annually)	Rates
First Income Bracket	250	3000	10%
Second Income Bracket	500	6000	20%
Third Income Bracket	1133	13600	25%
Fourth Income Bracket	1971	23650	30%
Fifth Income Bracket	above		37%
Flat Tax system			27%

This table classifies the amount of income in regular group. The first five categories are related to the current tax system of TRNC but the last one is different. Flat tax rate is the system of taxation which uses the same rate for all group of income with every quantity. This system is used in the simulation of the model of this study and will be explained later. At the end, Table 3 and 4 can be declared to define all the parameters required in the calculation of payable tax in this study.

4.3.2 Calculator

The amount of tax liability is calculated in this section. In fact the calculator is the most important part of the model. As it is clear from the name of this collection, all the essential calculation for tax amount is covered by this part. Indeed, the calculator explains the entire detail of the process that is required to find the accurate tax liability for each taxpayer. During the process of finding the aggregate tax payable, every economic variable which are related to the taxation will be defined. These economic parameters are referred to the gross earning and chargeable income of taxpayer. Table 5 shows the procedure of measuring the tax amount for individuals according to the all available data about their income, rate of allowances and volume of them, rate and brackets of income.

Table 5. Personal Income Tax Calculator Model

Personal Information				
Taxpayer ID				515
Marital Status				M
No. of Children				3
More Than 3 Children				0
Third Child				1
Child with 18<age<27 at Full educ.				1
Unmarried Child<20, 2th Scholl				0
Unmarried Child<16				1
Earnings				
Wages and Salaries				84,000.000
Social Security				7,560
Provident fund				3,360
Social Contribution				10,920
Gross Earnings				73,080
Personal Relief / Allowances / Deductions				
Standard Personal Tax Relief				0
Personal Allowances				12,948
Special Allowances				12,424
Marriage Allowance				1,036
Children Allowance				4,143
Total Personal Allowances				30,551
Chargeable Income				42,529
Tax Liability before Credit				
Income @ Bracket	Bracket	Rates		Tax Calculated
3,000	3,000	10%		300
3,000	6,000	20%		600
7,600	13,600	25%		1,900
10,050	23,650	30%		3,015
18,879	UP	37%		6,985
				<hr/>
42,529				12,800
Tax Credit				
Basic Tax Credit				0
Tax Payable				12,800
Effective Tax Rate				15.24%

Table 5 is the process of calculating the effective tax rate (ETR) for each taxpayer. This calculator can measure the tax liability and ETR just for one taxpayer. For example, this table shows the flow of finding the tax payable for person with taxpayer's ID Number of 515. This calculator works as follow: when there is requirement to find out any specific information related to each taxpayer, just enter the taxpayer ID of distinctive person. Consequently, all the information will change automatically and bring accurate ones that are related to the specific taxpayer. According to this calculator; for the taxpayer number 515, with personal information

of being married and have 3 children following information is obtained; by subtracting the social contribution from 84,000.00 TL as its annual wages it will have 73,080 TL as his/her gross earning. Then, by deducting the total personal allowances from gross earnings, the quantity acquired represented the chargeable income. The chargeable income is type of income which is required for calculating the tax liability. It emphasizes that the income based for measuring the tax payable is chargeable or taxable income. Thus, according to the statutory rates and income brackets of TRNC, the amount of tax payable will be determined. At the end, since the tax credit of TRNC is equal to zero, the tax payable is equivalent to the volume which is obtained according to income brackets.

4.3.3 Lookup

One aim of this study is to find the accurate value of tax payable relative to the gross income of individuals. Indeed, just an effective tax rate of one taxpayer is not scheduled contrariwise determining the effective tax rate for every person and compare it to the level of income is requested. In order to achieve this target, there is a requirement to classify the gross income. Lookup is the function of excel which help the user to sort the data by the way it is needed. This study also uses lookup to categorize the gross income. It means when income is classified in lookup, the class of income will be determined in the database of the model. Income distribution among the taxpayers is the issue which is significant to this research. The analysis is done by 5 quintile group is defined according to gross income (wages and salaries). The income categories which are obtained are shown as below in Table 6:

Table 6. Classifying Income Classes

Lookup Value	Income Class	Income Levels by Quintile		
0	1	0	<=	10,000.00
10,000.00	2	10,000.00	<=	21,356.30
21,356.30	3	21,356.30	<=	30,004.40
30,004.40	4	30,004.40	<=	44,162.00
44,162.00	5	44,162.00	<=	1,257,899.46

As mentioned previously, the gross income in this research is referred to the wages and salaries of taxpayers before any deduction. According to this classification, it becomes possible to make range for the effective tax rate relative to the level of income. In other words, this rate can determine how much tax should be paid by each taxpayer according to his/her income.

Total rate of social security and effective tax rate can be a great way to find out the relation between the range of gross income and the volume of tax liability. Effective tax rate is the average rate which gross income of individual is taxed. Considering the importance of this rate in order to find the appropriate tax liability for all individuals, this study calculates it for every residents of TRNC. The result of specific output shows that the highest percentage of effective tax rate is 26.07 which are related to the taxpayer of TRNC with 1,257,899.46 TL as largest volume of annual income. To have the general perspective of aggregate amount of effective tax rate and social security relative to each income groups of taxpayer, the average of ETR is required to be found. The relation of the income level and percentage of effective tax rate are provided in Table 7.

Table 7. Calculation of the Total Effective Tax Rate and Social Security of Current Tax System.

Level of Gross Wages and Salaries by quintile	Income class	Average of ETR	Rate of Social Security to Wage	Total ETR and SS
0_10,000.00	1	0.00%	9%	9%
10,000.00_21,356.30	2	0.07%	9%	9.07%
21,356.30_30,004.4	3	2.66%	9%	11.66%
30,004.40_44,162.00	4	7%	9%	16%
44,162.00_1,257,899.46	5	13.93%	9%	22.93%

Table 7 shows the aggregate rate of social security and effective tax rate for each class of income for the residents of TRNC. The base of both social security and effective tax rate are gross income. It means that the aggregate rate is represented as the whole percentage of gross wages before any deduction which is taxable. As a matter of fact, Table 7 represents following results; First class of income is the people with the earned income from zero to 10,000 TL annually. The amount of income for this group is monthly 833.3 TL, which is less than the minimum wage of individuals. Therefore, after subtracting all the deduction from gross income, the chargeable income for this group is either zero or negative amount. Thus, the volume of tax payable to income is zero. As a result, for the first class of income in TRNC the total rate which can be taxable is just 9%. The Second class of income determines range of income between 10,000 TL and 21,356.30 TL annually. In this category there are also many taxpayers which have gross income less than minimum wages that make the zero number for effective tax rate. In addition, there is some income which is not less than minimum wage and makes the average effective tax rate of 0.07% for this class of income. The ETR and 9% as the rate of social security on gross income make the total rate of 9.07% as the amount which can be taxed over gross income for this group. The third category of income allocates to the range

between 21,356.30 TL and 30,004.40 TL annually. The range of income in this group is greater than the two previous classes so it makes the average effective tax rate larger than those. Thus, it brings the rate of 11.66% as the aggregate rate which is an appropriate rate of taxation to gross income for this group. The fourth class of income refers to individual with any income between range of 30,004.40 TL and 44,162.0 TL annually. The calculated average ETR for this category is 7% and makes 16% as the total percentage of income which can be taxed. The last class of income is for taxpayers that are from 44,162.0 TL to 1,257,899.46 TL annually. The specific average of ETR of this income category is 13.93% plus 9% of income will take 22.93% which is the rate of whole tax payable as represented is based on the percentage of gross wages.

In conclusion, the table shows that according to the fix rate of social security on wages, with the greater level of gross income, the aggregate rate of tax payable on income will be higher. In other words, with the larger amount of income, the volume of chargeable income will be more and the effective tax rate is higher rate rather than in low income. Therefore, the tax liabilities that must be paid by individuals are much more in high income level which is represented as the total rate of social security and effective tax rate. The relatively positive relation between income level, amount of tax payable and ETR is applied for the progressive tax system.

Table 5 shows both the rate of social security and the effective tax rate together. This table regards to specific rate of social security which is 9% of gross earning but it can be explained in detail. Table 8 defines the detail of social security of each income classe

Table 8. Estimating the proportion of Social Security and Tax Payable to Income

Level of Income by Quintile	Income class	Proportion of total SS paid by income level	Proportion of Total Tax Calculated
0-10000	1	2.63%	0.00%
10000-21356.3	2	9.9%	0.1%
21356.3-30004.4	3	16.2%	4.45%
30004.4-44162	4	22.6%	15.85%
44162-1257899.46	5	48.7%	79.60%
All contributors		100%	100%

Table 8 represents the relationship between the shares of total tax payable and aggregate social security according to income level of individuals. The people, who have income less than 10,000.0 TL annually, have just 2.63 percent for share of social security and do not pay any taxes because of deductions. Taxpayers who involve second class of income have higher percentage of social security and also amount of tax payable. This trend will be continued for the rest groups of income. Videlicet it can be explained like this, for the larger class of income the proportion of social security would be higher and the amount of tax calculated for this specific group will be larger as well. As expected, there is positive relation between the volume of income and social security contribution. So it cause larger amount of tax calculated for individuals as well. It means the share of social security for each income category grows by amount of increasing the related level of its income.

4.3.4 Results

The previous section determined the volume of tax must that is paid by individual as the percentage of gross income. This section is assigned to the exact size of tax liability for taxpayers. In fact, this part focuses to represent the results of the model's output. As mentioned before, the aim is calculating the tax liability for taxpayer in

each specific groups of income. To achieve this target, it requires finding the aggregate amount of social security and tax payable for individuals under each income classes. Considered calculations are shown in Table 9 as below:

Table 9. Estimation of Tax Payable and Social Security

Income Class	Tax Payable	Sum of Estimated Social Security	Sum of Social Security and Tax payable
1	0	860,403.7	860,403.7
2	33,649.04	3,239,032.7	3,272,681.74
3	1,640,588.78	5,284,965.4	6,925,554.18
4	5,844,756.68	7,381,130.4	13,225,887.08
5	29,346,044.70	15,945,556.9	45,178,390.6
Total	36,865,039.20	32,711,089.1	69,576,128.33

Table 9 represents the calculated quantity of social security contribution and tax payable for each group of gross income. First category defines that; any taxpayer with earned income below 10,000.0 TL annually, it takes less than regular minimum wage of TRNC and after deducting the allowances, it will have negative or zero chargeable income. Consequently, the taxpayers of this group would not pay any taxes because of their zero taxable income. In addition to the definition of social security which is 9 percent of gross income, the amount of social security for this group is less than the other categories because of having wages less than 10,000.0 TL. As Table 9 shows the amount of social security and tax payable became larger from the first income class to five. The reason of this process is completely related to the tax system of TRNC which is the progressive tax system. In fact, as it is shown in Table 9, social security and tax payable are completely related to volume of income and change together in the same direction, and because of that North Cyprus is under the progressive system.

This chapter explained the original model made by this study and all the situation and process of tax payable calculation of base case. There are some tax reforms, other case and policy related to them which will be explained in the next chapter.

Chapter 5

EMPIRICAL RESULTS

Chapter 4 discusses the model created by this research in order to calculate the tax liability and the effective tax rate. The model explained in Chapter 4 is the base case of this study which consists of all the base rates and the income bracket coming from the tax law of TRNC. This chapter focuses on the simulation of the model with different options and compares the output of simulated model with the base case outputs. Flat tax system and change in the structure of allowances are some examples of the simulation issues. This chapter also explains the policy implication after this simulation.

5.1 Simulation

As reviewed before, in order to simulate the model, the proper technique is the micro-simulation technique. Indeed, micro-simulation is the best method for this study because of focusing on the single unit data of the model. In other words, the micro-simulation method works on individual behavior and can focus on the detail of the personal information. In addition, this technique can have effect on different perspectives of the public finance which is very important in this study. For example one of aspects of the public finance which is related to this research is the public pension of the individuals. Simulation is the important part of this thesis. By assisting the micro-simulation technique, it can simulate the effect of the proposed changes on the tax liability. These changes happen in the tax system such as the variation in tax rates or the income bracket, change in the rate and the value of allowances, and

changes in the structure of income, etc. The following are the samples of these changes and their implication is discussed.

5.1.1 Case 1; Flat Tax System

There are two types of tax system. One of them is the progressive tax system. The concept of progressive system is the amount of tax payable that grows relative to the increase level of income. This system is assigned for North Cyprus and because of this the base model is dedicated to this method to find the tax liability. The second one is the flat tax rate system. In flat tax system, there is just one rate for all the income brackets. According to that, base case is under the progressive system, so the proposed changes in this part use the flat rate for all the income brackets. In fact, just one parameter is changed which is related to the tax rate. One of the interesting issues is the details of the tax liability for each class of income and it compares them in both flat and progressive tax system. At this point it can be asked that what is the proper rate for the flat system. It can be expressed as the expectable percentage for this system is the rate that gives the same amount of revenue obtained in the progressive tax system. Thus, by using the simulation, it is found that the appropriate rate for this system is 27%. Determining the revenue obtained for all the income brackets can demonstrate the details of changes in the process of tax liability just for one taxpayer. Table 10 shows the results after the flat tax case is simulated. The base case shown in table is described as the results of the progressive system (current system) and the optional case refers to the results of the policy changed (flat tax).

Table 10. Comparing Estimation of Effective Tax Rate in Progressive and Flat Tax System

		Base Case		Optional Case	
Personal information					
Taxpayer ID		515		515	
Marital Status		M		M	
No. of children		3		3	
More than 3 child.		0		0	
Third child		1		1	
Child with 18<age<27, full educ		1		1	
Child with age<20, second scholl		0		0	
Child with age<16		1		1	
Earnings					
Wages and Salaries		84,000.000		84,000.000	
Social Security		7,560		7,560	
Provident fund		3,360		3,360	
Gross Earnings		73,080		73,080	
Personal relief, allowances, deductions					
Standard personal tax relief		0		0	
Personal allowances		12,948		12,948	
Special allowances		12,424		12,424	
Marriage allowances		1036		1036	
Children allowances		4143		4143	
Total Personal allowances		30,551		30,551	
Chargeable Income		42,529		42,529	
Tax Liability before credit					
Income @ bracket	Bracket	Rates (base case)	Calculated Tax	Rates (Flat Rate)	Calculated
3000	3000	10%	300	27%	810
3000	6000	20%	600	27%	810
7600	13600	25%	1900	27%	2051.98
10050	23650	30%	3015	27%	2713.5
18879		37%	6985	27%	5097.39
42,529		12800			11482.88
Tax Credit					
Basic Tax Credit		0		Basic Tax credit	
				0	
Tax Payable		12800		Tax Payable	
				11482.88	
Effective Tax Rate		15.24%		Effective Tax Rate	
				14%	

Table 10 is a typical taxpayer model which represents the tax liability and the effective tax rate. The information that is included in Table 10 refers to taxpayer ID 515 in both the current tax system and the flat rate. The output shows just by changing the tax rate with no other tax parameters this taxpayer will pay 1317.43 TL less than under the current tax system. This person annually has 84000.0 TL which is placed under the fifth income category. According to the huge number of taxpayers which are 11177 in total, it is better to take the results of simulation as the average amount of the revenue. The desired revenue is obtained from the summation of the social security and the effective tax rate. All the calculations with their simulation of flat tax rate are done and the results are obtained. The results are shown in Table 11 as below:

Table 11. Impact of 27% Flat Tax on Tax liability and Revenue.

Income class	Level of Income by Quintile	Base Case			27% Flat Rate and 9% Social Security		
		Average of ETR	Rate of S.S	Total ETR and S.S	Average of ETR	Rate of S.S	Total ETR and S.S
1	0-10000	0.00%	9%	9%	0.00%	9%	9%
2	10000-21356.3	0.07%	9%	9.07%	0.19%	9%	9.19%
3	21356.3-30004.4	2.66%	9%	11.66%	4.98%	9%	13.98%
4	30004.4-44162	7%	9%	16%	9.23%	9%	18.23%
5	44162-1257899.46	13.93%	9%	22.93%	13.47%	9%	22.47%

In this simulation just tax rate is changed and other conditions of the tax structure are the same as the base case. So, the social security is still 9 percentage of wages and salaries of individuals. According to Table 11, the revenue from the personal income taxation gets bigger in the first four levels of income when compared to the base

case. In other words, people with an annually income less than 44,162.0TL must pay more tax in the flat system rather than the progressive one. For the first class of income the percentage of revenue to income is the same in both tax systems. People who have income under the second category must pay more tax in the flat tax system rather than the current one. This process of increasing the tax payable or government revenue is continued in four levels of income but the amount of growth is not identical. If there is one peak for this, increasing trend is assigned to the third class of income. Then, in the fourth income category the revenue will increase but not as much as the third class, but for the fifth group of income the percentage of revenue to income is less than in flat rate than in the current system. Therefore, it can be concluded that for any taxpayers who have the gross income less than 44,162.00 TL, they will lose money with flat rate whereas for the ones who have gross income more than this amount, they will gain. Indeed, the taxpayer with very high income bracket whom included in the fifth class of income, gains from the flat tax system whilst the other groups are the loser. It shows that flat tax system is not good for people with annual income less than 44,162.0 TL.

It is noteworthy that any changes in other sections of the tax structure are essential along with this unit rate. Namely, these outputs of simulation help the policy maker to understand the direction of changes by the proposed policy and also find out which policy is in the same way as the government target.

5.1.2 Case 2; Change in the Structure of Social Contribution

Social security and provident fund are the two types of social contributions which are discussed in this study. Both of these contributions are represented as the specific percentage of gross income. According to the tax law of TRNC, the determined rate for the provident fund is 4% and for social security it is 9 % of gross income. Among

these two categories, social security is the proper one to make simulation on it. In fact, the target is that by making any changes in the rate of social security what will be happen in the amount of revenue in each classes of income and what is the appropriate rate for the flat tax system which give the same amount of revenue as the base case. In Case 2, all the parameters are constant and they just change the social security and simulate the flat rate for this case. In other words, with doubling the social security rate what is the proper flat rate for this model? Indeed, if the rate of social security changes from 9% to 18% what is the accurate rate obtained by simulation in order to have the same amount of revenue. In Table 12, base case represents the current tax system of TRNC which is the progressive system of taxation with the 9% of social security. Case 2 is the scenario of the simulation of tax rate. The target of this case is simulating the accurate tax rate to obtain the same revenue as the progressive tax system to increase the percentage of social security from 9 to 18. The following table presents the percentage of tax payable and revenue of it before and after the simulation.

Table 12. Estimation of Revenue with 18% Social Security and 4 % Flat rate as Case 2.

Income class	Level of Income by Quintile	Base Case			Case 2 with 18% Social Security and 4% Flat Rate		
		Average of ETR	Rate of S.S	Total ETR and S.S	Average of ETR	Rate of S.S	Total ETR and S.S
1	0-10000	0.00%	9%	9%	0.00%	18%	18%
2	10000-21356.3	0.07%	9%	9.07%	0.00%	18%	18%
3	21356.3-30004.4	2.66%	9%	11.66%	0.4%	18%	18.4%
4	30004.4-44162	7%	9%	16%	0.99%	18%	18.99%
5	44162-1257899.46	13.93%	9%	22.93%	1.57%	18%	19.57%

Simulation expresses that with the 18% social security, flat system must have the tax rate of 4% in order to have the same amount of revenue as much as the base case.

Referring back to Table 12, the tax liability gets too much lower because of a twofold increase in social security. In other words, when the percentage of social security to income goes up the size of tax payable for each class of income must scroll down to cover the same amount of revenue in the current system. As Table 12 demonstrates, the tax liability for the first two income classes are zero and the taxpayer with income less than 21356.3 TL do not pay anything as income tax. In overall, the average amount of the effective tax rate to income under new policy is 2.96 whereas it was 23.66 at the current tax policy.

5.1.3 Case 3; The Change in the Structure of Allowances

The third simulation refers to make change in the structure of deductions. Changes are in the structure that indicates various percentage of the allowance to see what would happen in the quantity of tax liability and the effective tax rate. Firstly, choose the children allowances to do simulation. As mentioned previously in Chapter 3, there are five categories for children deduction. If it is decided to make change in these allowances, one must use just the single rate for all the five categories. For example, assume 5 percent as the rate of children deduction in each level by any characteristics. In addition, creating changes is the time of simulation to find the proper flat tax rate but simulation shows that making variation in children allowances does not have any effects on the flat rate. In other words, with changing the rate of children deduction to 5% the same rate of flat rate (27%) give the particular volume of revenue. This is to say that the children allowance is not a significant one and is not a great one to show the simulation fluctuations. Therefore, choose another deduction to do the simulation process. Among all, the deduction allocates to taxpayers in the TRNC, opt special allowances. The structure of selected allowance is made from the percentage of gross earning and it leads to have a significant range

of numbers which can show the simulation result in a better trend. The current percentage of this allowance is 17% and it makes change for it by applying the zero rates. In fact, it is better to divide Case 3 in two parts with different conditions; A) Firstly, do simulation to find the proper rate for flat tax rate with assuming zero rate for special allowances with the 18% of social security.

Table 12. Case 3a; Estimating the Average Effective Tax Rate and Simulate the Flat Tax Rate

Income class	Level of Income	Base Case			Case 3a; with zero special allowance, 9% Social Security and 23% Flat Tax Rate		
		Average of ETR	Rate of S.S	Total ETR and S.S	Average of ETR	Rate of S.S	Total ETR and S.S
1	0-10000	0.00%	9%	9%	0.00%	9%	9.00%
2	10000-21356.3	0.07%	9%	9.07%	0.00%	9%	9.00%
3	21356.3-30004.4	2.66%	9%	11.66%	0.39%	9%	9.39%
4	30004.4-44162	7%	9%	16%	0.98%	9%	9.98%
5	44162-1257899.46	13.93%	9%	22.93%	1.57%	9%	10.57%

Simulation shows that under the mentioned conditions, the flat tax rate must be equal to 23% to have the same amount of revenue as the base case in the progressive tax system. This is to say that when the social security is equal to the base case, the flat tax rate must be very high to obtain the same revenue as previously. As the table shows for the two of first levels of income the average amount of effective tax rate is zero. It means that for the taxpayers who have income less than 21,356.3 TL annually, the effective rate of tax payable is zero and the revenue of the government will get from the percentage of social security for these groups of taxpayers. In overall the average amount of effective tax rate for all groups of income classes will decrease when compared to the base case. Therefore, the revenue of this case is reduced in this case when compared to the base case.

B) The second case is finding the proper rate of social security by assuming the zero rate of special allowances and 4% of flat tax rate.

Table 13. Case 3b; Estimating the Average ETR and simulate the Social Security Rate

Income class	Level of Income	Base Case			Case 3b; with zero special allowance, 18% Social Security and 4% Flat Tax Rate		
		Average of ETR	Rate of S.S	Total ETR and S.S	Average of ETR	Rate of S.S	Total ETR and S.S
1	0-10000	0.00%	9%	9%	0.00%	18%	18.00%
2	10000-21356.3	0.07%	9%	9.07%	0.00%	18%	18.00%
3	21356.3-30004.4	2.66%	9%	11.66%	0.52%	18%	18.52%
4	30004.4-44162	7%	9%	16%	1.29%	18%	19.29%
5	44162-1257899.46	13.93%	9%	22.93%	2.06%	18%	20.06%

After the simulation the accurate rate of social security must be 18% for this case. Accordingly, the higher percentage of social security is required to cover the zero percentage of special allowances whereas the flat rate is just 4% in this situation. When the flat tax rate is too low and the percentage of social security to wages is zero, the amount of tax liability for the two first class of income goes to zero. In fact, the quantity of tax payable is started for the taxpayers who have income more than 21,356 TL annually. Though, because of doubling the rate of social security the amount of revenue is increased in the first four groups of income but for taxpayers in the last income class, the base case is still have more revenue than the this scenario.

5.1.4 Results

The previous section explains all the alternatives of both base cases of this study and the case of simulation in details. Now, this part brings all the results of simulation in both types of percentage and the numerical to understand the differences of alternatives and the base case better. Firstly, Table 14 brings all the results in percentage together to compare all the cases easily with each other. The result is shown as the revenue for each category according to that the revenue is defined as the summation of tax payable and the social security. As mentioned previously, each case has the following terms:

Base case; is the progressive tax system with five income brackets and tax rates for them. Case 1; presents the 27% flat tax system with 9% of social security. Case 2; is 18% social security and 4% flat tax rate. Case 3A; is 0% of special allowance with the 9% social security and 23% flat tax rate. Case 3B; is 0% of special allowances with the 4% of flat tax rate and 18% of social security.

Table 14. Revenue of Personal Income Tax for Each Income Levels for All Alternatives

Income class	Level of Income by Quintile	Revenue of Base Case	Revenue of Case 1	Revenue of Case 2	Revenue of case 3A	Revenue of Case 3B
1	0-10000	9%	9%	18%	9.00%	18.00%
2	10000-21356.3	9.07%	9.19%	18%	9.00%	18.00%
3	21356.3-30004.4	11.66%	13.98%	18.4%	9.39%	18.52%
4	30004.4-44162	16%	18.23%	18.99%	9.98%	19.29%
5	44162-1257899.46	22.93%	22.47%	19.57%	10.57%	20.06%

Referring back to Table 14, it is understood that the revenue in the base case is more than the other alternatives with different conditions. That is, the progressive tax system makes more revenue than the flat tax system for the government.

The next step is showing these results in the numerical way because the numerical amount of those changes might make more clarification with details of changes during the simulation. Accordingly, the results of simulation demonstrated in section 5.1 by each income categories refer to the aggregate amount of tax liability for all the income groups together. As mentioned before, the tax payable in the base case which is the progressive tax system is equal to 36,865,039.20 and the sum of estimated social security is 32,711,089.1 in this case. Therefore, the aggregate amount of tax payable and social security in the base case is 69,576,128.33. The target of simulation is to achieve the same amount of revenue as much as the base case with different details for each alternative. Table 15 shows all these information in numerical types. This is to say that the current tax system of TRNC is progressive and making simulation according to such system might be difficult, so it is better to make the same amount of revenue by the flat system and use the flat one for simulation.

Table 15. Numerical Amount of Simulation Cases.

	Sum of Chargeable Income	Tax Payable (Flat Rate)	Sum of Estimated Social Security	Sum of S.S and TP (Flat Rate)	Sum of All Allowances
Case 1 ; (9% S.S , 27% Flat rate)	107,122,736.1	36,865,039.20	32,711,089.1	69,576,128.33	209,084,480.9
Case 2; (18% S.S, 4% Flat rate)	79,824,407.0	4,153,950.07	65,422,178.3	69,576,128.33	203,671,720.8
Case 3A ; (0% special allowance,23% Flat tax,9% S.S)	129,214,696.9	36,865,039.20	32,711,089.1	69,576,128.33	186,992,520.0
Case 3B; (0% special allowance,4% Flat tax,18% S.S)	97,789,042.9	5,439,385.17	64,136,743.2	69,576,128.33	186,992,520.0

Table 15 indicates the volume of revenue in each case. Referring back to Table 15, first row is the flat tax system for TRNC which expresses that for having the same amount of revenue in the flat tax system 4% is required as the single rate. Second row refers to the scenario of double rate of social security that requires the same flat rate of tax of 4%. In this scenario, the amount of social security is increased considerably to compensate the reduction in the amount of tax payable. Accordingly, the third row presents the conditions with the percentage of zero rate of special allowance but with the same rate of social contribution, the unit rate of the flat system must be equal to 23% to achieve the same amount of revenue again. In this scenario, there is not much more changes in the amount of tax payable and also revenue. The fourth row demonstrates the last case of the simulation in this study. In this case, because of the zero percentage of special allowances and 4% of flat tax rate the social security must have the rate of 18% to compensate these reductions in rates and the amount of tax payable.

5.2 Policy Implication

Tax policy alludes to the logic that determines the amount of income that the government is gaining, whether the most appropriate way is chosen to collect revenue by the government, and for what this income is being used. Tax policy resolution pursues a process that consists of two steps: the first one recognizes the goal of particular levy mediums, and the second one appraises how well those mediums achieve their aims (Edgar, T., and Sandler, D., 2005) .

After assessing the revenue of the taxpayer which is the summation of the average rate of social security to wages and the average rate of effective tax rate is the time of explaining the policy of the current system and the new one. The first policy used in the simulation is that, if just the flat rate is used rather than the progressive one for income bracket, relatively simulation obtains high single rate to cover the same revenue as the progressive system. Therefore, if there is requirement to use flat system, the accurate rate is high percentage.

Another interesting policy is related to the social security rate. There is a negative relation between the social security and the tax liability. As the simulation results are demonstrated, when the rate of social security goes up consequently quantity of this contribution increases and the amount of tax payable by taxpayer will decrease. In fact, people might be satisfied to pay income tax on their social security in order to secure their future situation. Therefore, when the rate of social security goes up people have to pay more percentage of gross income (their wages) to ensure their future safety, so they do not accept to pay high amount of taxes again in same situation. Indeed, they directly pay for their future security.

Chapter 6

CONCLUSION

There are two important issues for this economy at this time; first one is the tax evasion which is made by the people and second one is referred to the large amount of deficit in the social security system of TRNC. This thesis tries to find the best solution of these issues. Thus find the revenue of the personal income tax for TRNC in 2011. However this revenue system is referring to the government but simultaneous must provide more incentive for people to pay their income tax. Therefore, there is a requirement to have the model for calculating the tax liability of each taxpayer and estimate the revenue for them. Definitely one of the interesting points in revenue forecasting is the quantity of tax payable for individuals according to their income distribution. The outcome of the base case model (current tax system of TRNC) shows that because of the progressive tax system of TRNC, the amount of tax liability is much higher for the group of income with higher level of income rather than those that have lower income. So, there is a positive relationship between the level of income and the size of tax payable for individuals. This one is just one of simple results of this study which causes much more interesting cases for personal income tax model.

After assessing the model to estimate the tax liability, making changes in the tax structure is an interesting idea in order to find the relation between other parameters

of personal income tax model. Therefore, the simulation is used and the following results are found:

- With the idea of changing the tax system from progressive to flat tax rate and have the same amount of revenue in the flat system, there is a requirement to have a great unit rate of 27% for all the income brackets. Generally it shows that in order to move from progressive system to flat tax system the single rate is not too low. Otherwise if there is necessity to use the progressive tax system the solution of tax evasion is using the lower tax rate. Videlicet the higher tax rate cause much more tax payable which people have less incentive to pay their income taxes.
- One of the important results of this study is the relationship between the social security and the tax liability. People must be ensuring about their future and because of this they pay income tax on their social security. In other words, people pay social security contribution to get their pension. Thus, when the rate of social security (which percentage of gross income) is made double, people are not satisfied to pay more money in both of tax payable and social contribution. Because of this with more percentage of social security the taxpayer prefers to pay less amount of tax. That is, it increases the social security to cover the deficit rather than increase tax revenue. This condition is for people who pay taxes. If individuals avoid income tax, they do not worry about their money when the rate of social security goes up. As a matter of fact when people get more income tax on the social security, it means that the subsidies are lower because the net subsidy given to people on social security.

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APPENDICES

Appendix A. Sample of Database for Tax Calculation and Effective Tax Rate of First Current Tax System

Appendix A.1

Taxpayer ID	Marital Status	No. of Children	More Than 3 children	Third Child	Child With 18<age<27, at Full Educ.	Unmarried Child<20 yrs. 2th Scholl	Unmarried Child<16	Wages and Salaries	Social Security	Provident fund	Social Contribution	Gross Earnings	Personal Allowances	Special Allowances
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
TAX_ID	MAR_STAT_US	NO_CLD	5%	15%	10%	8%	6%	WAGES_SAL	9% VAGE	4% VAGE	S.S+P.F	GE	P.A	17% G.E
8986	M	0	0	0	0	0	0	9,938.00	894.4	397.5	1292	8646	12948	1470
9102	S	0	0	0	0	0	0	9,048.80	814.4	362	1176	7872	12948	1338
9180	M	0	0	0	0	0	0	8,644.40	778	345.8	1124	7521	12948	1279
9323	M	0	0	0	0	0	0	7,820.70	703.9	312.8	1017	6804	12948	1157
9464	W	0	0	0	0	0	0	7,014.30	631.3	280.6	912	6102	12948	1037
9602	M	0	0	0	0	0	0	6,230.10	560.7	249.2	810	5420	12948	921
9638	S	0	0	0	0	0	0	6,000.00	540	240	780	5220	12948	887
9856	M	0	0	0	0	0	0	5,000.00	450	200	650	4350	12948	740
9992	M	0	0	0	0	0	0	4,400.00	396	176	572	3828	12948	651
10025	S	0	0	0	0	0	0	4,200.00	378	168	546	3654	12948	621
10066	M	0	0	0	0	0	0	4,000.00	360	160	520	3480	12948	592
10158	M	0	0	0	0	0	0	3,768.90	339.2	150.8	490	3279	12948	557
10209	M	0	0	0	0	0	0	3,500.00	315	140	455	3045	12948	518
10253	M	0	0	0	0	0	0	3,300.00	297	132	429	2871	12948	488
10327	W	0	0	0	0	0	0	3,000.00	270	120	390	2610	12948	444
10781	M	0	0	0	0	0	0	1,293.70	116.4	51.7	168	1126	12948	191
10869	M	0	0	0	0	0	0	1,012.00	91.1	40.5	132	880	12948	150
10935	M	0	0	0	0	0	0	859.3	77.3	34.4	112	748	12948	127
11057	M	0	0	0	0	0	0	407.9	36.7	16.3	53	355	12948	60
11157	M	0	0	0	0	0	0	75	6.8	3	10	65	12948	11

Appendix A.2

	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Marriage Allowance	Children Allowance	All Allowances	Chargeable Income	Total Income	Income Class	First Income Bracket	Second Income Bracket	Third Income Bracket	Fourth Income Bracket	Fifth Income Bracket	Tax Liability	Tax Payable	Effective tax rate over wages	
MAR_ALL	CLD_ALL	TOTAL	TAX_BASE	WAGES	INCOME_CLASS	10%	20%	25%	30%	37%	TAX LIABILITY	TAX_CALCULATED	ETR	
1,035.80	-	15,453.70	-6,807.60	9,938.00	1	-	-	-	-	-	-	-	-	0.00%
-	-	14,286.30	-6,413.90	9,048.75	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,262.30	-7,741.70	8,644.37	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,140.50	-8,336.50	7,820.67	1	-	-	-	-	-	-	-	-	0.00%
517.9	-	14,503.30	-8,400.90	7,014.31	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,905.30	-9,485.10	6,230.05	1	-	-	-	-	-	-	-	-	0.00%
-	-	13,835.40	-8,615.40	6,000.00	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,723.30	-10,373.30	5,000.00	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,634.60	-10,806.60	4,400.00	1	-	-	-	-	-	-	-	-	0.00%
-	-	13,569.20	-9,915.20	4,200.00	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,575.40	-11,095.40	4,000.00	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,541.30	-11,262.30	3,768.88	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,501.50	-11,456.50	3,500.00	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,471.90	-11,600.90	3,300.00	1	-	-	-	-	-	-	-	-	0.00%
517.9	-	13,909.60	-11,299.60	3,000.00	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,175.20	-13,049.70	1,293.71	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,133.50	-13,253.10	1,011.98	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,110.90	-13,363.40	859.28	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	14,044.20	-13,689.30	407.9	1	-	-	-	-	-	-	-	-	0.00%
1,035.80	-	13,994.90	-13,929.70	75.01	1	-	-	-	-	-	-	-	-	0.00%

Appendix B. Sample of Database for Tax Calculation and Effective Tax Rate of Second Class of Income in Current Tax System

Appendix B.1

Taxpayer ID	Marital Status	No. of Children	More Than 3 children	Third Child	Child With 18<age<27, at Full Educ.	Unmarried Child<20 yrs. 2th Scholl	Unmarried Child<16	Wages and Salaries	Social Security	Provident fund	Social Contribution	Gross Earnings	Personal Allowances	Special Allowances
TAX_ID	MAR_STAT US	NO_CLD	5%	15%	11%	8%	6%	WAGES_SAL	9% WAGE	4% WAGE	S.S.+P.F	GE	P.A	17% G.E
6723	M	0	0	0	0	0	0	21,200.00	1,908.00	848	2756	18444	12948	3135
6802	M	0	0	0	0	0	0	20,864.20	1,877.80	834.6	2712	18152	12948	3086
6933	M	0	0	0	0	0	0	20,133.90	1,812.00	805.4	2617	17516	12948	2978
7249	S	0	0	0	0	0	0	18,430.20	1,658.70	737.2	2396	16034	12948	2726
7387	M	0	0	0	0	0	0	18,000.00	1,620.00	720	2340	15660	12948	2662
7513	S	0	0	0	0	0	0	17,809.50	1,602.90	712.4	2315	15494	12948	2634
7668	M	0	0	0	0	0	0	16,800.00	1,512.00	672	2184	14616	12948	2485
7685	W	0	0	0	0	0	0	16,708.60	1,503.80	668.3	2172	14537	12948	2471
7866	W	0	0	0	0	0	0	15,884.30	1,429.60	635.4	2065	13819	12948	2349
7886	M	0	0	0	0	0	0	15,738.10	1,416.40	629.5	2046	13692	12948	2328
8045	M	0	0	0	0	0	0	15,525.40	1,397.30	621	2018	13507	12948	2296
8147	M	0	0	0	0	0	0	15,000.00	1,350.00	600	1950	13050	12948	2219
8390	M	0	0	0	0	0	0	13,279.20	1,195.10	531.2	1726	11553	12948	1964
8448	M	0	0	0	0	0	0	12,925.20	1,163.30	517	1680	11245	12948	1912
8570	M	0	0	0	0	0	0	12,000.00	1,080.00	480	1560	10440	12948	1775
8719	M	0	0	0	0	0	0	11,300.00	1,017.00	452	1469	9831	12948	1671
8837	M	0	0	0	0	0	0	10,465.40	941.9	418.6	1360	9105	12948	1548
8912	M	0	0	0	0	0	0	10,089.70	908.1	403.6	1312	8778	12948	1492
8944	M	0	0	0	0	0	0	10,000.00	900	400	1300	8700	12948	1479
8970	M	0	0	0	0	0	0	10,000.00	900	400	1300	8700	12948	1479

Appendix B.2

16	17	18	19	20	21	22	23	24	25	26	27	28	29
MARR_ALL	CLD_ALL	TOTAL	TAX_BASE	WAGES	INCOME_CLASS	First Income Bracket	Second Income Bracket	Third Income Bracket	Fourth Income Bracket	Fifth Income Bracket	TAX LIABILITY	TAX_CALCULATED	ETR
1,035.80	-	17,119.30	1,324.70	21,200.00	2	132.47	-	-	-	-	132.47	132.47	0.62%
1,035.80	-	17,069.70	1,082.20	20,864.19	2	108.22	-	-	-	-	108.22	108.22	0.52%
1,035.80	-	16,961.60	554.8	20,133.87	2	55.48	-	-	-	-	55.48	55.48	0.28%
-	-	15,673.80	360.4	18,430.18	2	36.04	-	-	-	-	36.04	36.04	0.20%
1,035.80	-	16,646.00	-986	18,000.00	2	-	-	-	-	-	-	-	0.00%
-	-	15,582.00	-87.8	17,809.47	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	16,468.60	-1,852.60	16,800.00	2	-	-	-	-	-	-	-	0.00%
517.9	-	15,937.10	-1,400.60	16,708.64	2	-	-	-	-	-	-	-	0.00%
517.9	-	15,815.20	-1,995.80	15,884.33	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	16,311.50	-2,619.40	15,738.08	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	16,280.00	-2,773.00	15,525.36	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	16,202.30	-3,152.30	15,000.00	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,947.80	-4,395.00	13,279.16	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,895.50	-4,650.50	12,925.22	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,758.60	-5,318.60	12,000.00	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,655.10	-5,824.10	11,300.00	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,531.70	-6,426.80	10,465.35	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,476.10	-6,698.10	10,089.71	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,462.80	-6,762.80	10,000.00	2	-	-	-	-	-	-	-	0.00%
1,035.80	-	15,462.80	-6,762.80	10,000.00	2	-	-	-	-	-	-	-	0.00%

Appendix C. Sample of Database for Tax Calculation and Effective Tax Rate of Third Class of Income in Current Tax System

Appendix C.1

Taxpayer ID	Marital Status	No. of Children	More Than 3 children	Third Child	Child With 18<age<27, at Full Educ.	Unmarried Child<20 yrs. 2th Scholl	Unmarried Child<16	Wages and Salaries	Social Security	Provident fund	Social Contributio n	Gross Earnings	Personal Allowances	Special Allowances
TAX_ID	MAR_STAT US	NO_CLD	5%	15%	11%	8%	6%	WAGES_SAL	9% WAGE	4% WAGE	S.S+P.F	GE	P.A	17% G.E
4478	S	0	0	0	0	0	0	30,000.00	2,700.00	1,200.00	3900	26100	12948	4437
4503	M	0	0	0	0	0	0	30,000.00	2,700.00	1,200.00	3900	26100	12948	4437
4553	M	0	0	0	0	0	0	30,000.00	2,700.00	1,200.00	3900	26100	12948	4437
4793	M	0	0	0	0	0	0	30,000.00	2,700.00	1,200.00	3900	26100	12948	4437
5031	W	0	0	0	0	0	0	28,800.00	2,592.00	1,152.00	3744	25056	12948	4260
5155	S	0	0	0	0	0	0	28,000.00	2,520.00	1,120.00	3640	24360	12948	4141
5209	M	0	0	0	0	0	0	27,730.00	2,495.70	1,109.20	3605	24125	12948	4101
5230	M	0	0	0	0	0	0	27,600.00	2,484.00	1,104.00	3588	24012	12948	4082
5353	M	0	0	0	0	0	0	27,000.00	2,430.00	1,080.00	3510	23490	12948	3993
5416	M	0	0	0	0	0	0	26,642.10	2,397.80	1,065.70	3463	23179	12948	3940
5695	W	0	0	0	0	0	0	25,065.90	2,255.90	1,002.60	3259	21807	12948	3707
5706	M	0	0	0	0	0	0	25,000.00	2,250.00	1,000.00	3250	21750	12948	3698
5851	M	0	0	0	0	0	0	24,167.90	2,175.10	966.7	3142	21026	12948	3574
6154	M	0	0	0	0	0	0	24,000.00	2,160.00	960	3120	20880	12948	3550
6293	M	0	0	0	0	0	0	23,573.10	2,121.60	942.9	3065	20509	12948	3486
6358	S	0	0	0	0	0	0	23,217.60	2,089.60	928.7	3018	20199	12948	3434
6500	M	0	0	0	0	0	0	22,416.30	2,017.50	896.7	2914	19502	12948	3315
6634	M	0	0	0	0	0	0	21,600.00	1,944.00	864	2808	18792	12948	3195
6690	M	0	0	0	0	0	0	21,500.00	1,935.00	860	2795	18705	12948	3180
6703	M	0	0	0	0	0	0	21,375.00	1,923.80	855	2779	18596	12948	3161

Appendix C.2

16	17	18	19	20	21	22	23	24	25	26	27	28	29
MARR-ALL	CHLD-ALL	TOTAL	TAX_BASE	WAGES	INCOME CLASS	First Income Bracket	Second Income Bracket	Third Income Bracket	Forth Income Bracket	Fifth Income Bracket	TAX LIABILITY	TAX CALCULATED	ETR
-	-	17,385.00	8,715.00	30,000.00	3	300	600	678.75	-	-	1,578.75	1,578.75	5.26%
1,035.80	-	18,420.80	7,679.20	30,000.00	3	300	600	419.79	-	-	1,319.79	1,319.79	4.40%
1,035.80	-	18,420.80	7,679.20	30,000.00	3	300	600	419.79	-	-	1,319.79	1,319.79	4.40%
1,035.80	-	18,420.80	7,679.20	30,000.00	3	300	600	419.79	-	-	1,319.79	1,319.79	4.40%
517.9	-	17,725.40	7,330.60	28,800.00	3	300	600	332.64	-	-	1,232.64	1,232.64	4.28%
-	-	17,089.20	7,270.80	28,000.00	3	300	600	317.7	-	-	1,217.70	1,217.70	4.35%
1,035.80	-	18,085.10	6,040.00	27,729.96	3	300	600	9.99	-	-	909.99	909.99	3.28%
1,035.80	-	18,065.90	5,946.10	27,600.00	3	300	589.22	-	-	-	889.22	889.22	3.22%
1,035.80	-	17,977.10	5,512.90	27,000.00	3	300	502.57	-	-	-	802.57	802.57	2.97%
1,035.80	-	17,924.20	5,254.40	26,642.06	3	300	450.88	-	-	-	750.88	750.88	2.82%
517.9	-	17,173.20	4,634.10	25,065.87	3	300	326.83	-	-	-	626.83	626.83	2.50%
1,035.80	-	17,681.30	4,068.70	25,000.00	3	300	213.73	-	-	-	513.73	513.73	2.05%
1,035.80	-	17,558.30	3,467.80	24,167.85	3	300	93.55	-	-	-	393.55	393.55	1.63%
1,035.80	-	17,533.40	3,346.60	24,000.00	3	300	69.31	-	-	-	369.31	369.31	1.54%
1,035.80	-	17,470.30	3,038.30	23,573.12	3	300	7.66	-	-	-	307.66	307.66	1.31%
-	-	16,381.90	3,817.40	23,217.60	3	300	163.49	-	-	-	463.49	463.49	2.00%
1,035.80	-	17,299.20	2,202.90	22,416.25	3	220.29	-	-	-	-	220.29	220.29	0.98%
1,035.80	-	17,178.50	1,613.50	21,600.00	3	161.35	-	-	-	-	161.35	161.35	0.75%
1,035.80	-	17,163.70	1,541.30	21,500.00	3	154.13	-	-	-	-	154.13	154.13	0.72%
1,035.80	-	17,145.20	1,451.00	21,375.00	3	145.1	-	-	-	-	145.1	145.1	0.68%

Appendix D. Sample of Database for Tax Calculation and Effective Tax Rate of Fourth Class of Income in Current Tax System

Appendix D.1

Taxpayer ID	Marital Status	No. of Children	More Than 3 children	Third Child	Child With 18<age<27, at Full Educ.	Unmarried Child<20 yrs. 2th School	Unmarried Child<16	Wages and Salaries	Social Security	Provident fund	Social Contribution	Gross Earnings	Personal Allowances	Special Allowances
TAX_ID	MAR_STAT US	NO_CLD	5%	15%	11%	8%	6%	WAGES_SAL	9% WAGE	4% WAGE	S.S.+P.F	GE	P.A	17% G.E
2236	W	0	0	0	0	0	0	44,129.00	3,971.60	1,765.20	5737	38392	12948	6527
2252	M	0	0	0	0	0	0	44,000.00	3,960.00	1,760.00	5720	38280	12948	6508
2260	M	0	0	0	0	0	0	43,829.10	3,944.60	1,753.20	5698	38131	12948	6482
2334	S	0	0	0	0	0	0	42,367.60	3,813.10	1,694.70	5508	36860	12948	6266
2402	W	0	0	0	0	0	0	42,000.00	3,780.00	1,680.00	5460	36540	12948	6212
2547	M	0	0	0	0	0	0	42,000.00	3,780.00	1,680.00	5460	36540	12948	6212
2625	M	1	0	0	0	0	1	42,000.00	3,780.00	1,680.00	5460	36540	12948	6212
2872	M	0	0	0	0	0	0	40,000.00	3,600.00	1,600.00	5200	34800	12948	5916
3121	M	0	0	0	0	0	0	37,000.00	3,330.00	1,480.00	4810	32190	12948	5472
3253	M	0	0	0	0	0	0	36,000.00	3,240.00	1,440.00	4680	31320	12948	5324
3367	M	0	0	0	0	0	0	36,000.00	3,240.00	1,440.00	4680	31320	12948	5324
3516	M	0	0	0	0	0	0	36,000.00	3,240.00	1,440.00	4680	31320	12948	5324
3709	S	0	0	0	0	0	0	35,750.00	3,217.50	1,430.00	4648	31103	12948	5287
3907	W	0	0	0	0	0	0	34,076.60	3,066.90	1,363.10	4430	29647	12948	5040
4060	M	0	0	0	0	0	0	33,000.00	2,970.00	1,320.00	4290	28710	12948	4881
4244	M	0	0	0	0	0	0	31,800.00	2,862.00	1,272.00	4134	27666	12948	4703
4285	M	0	0	0	0	0	0	31,350.00	2,821.50	1,254.00	4076	27275	12948	4637
4426	M	0	0	0	0	0	0	30,280.50	2,725.20	1,211.20	3936	26344	12948	4478
4443	S	0	0	0	0	0	0	30,100.00	2,709.00	1,204.00	3913	26187	12948	4452
4450	M	0	0	0	0	0	0	30,046.30	2,704.20	1,201.90	3906	26140	12948	4444

Appendix D.2

16	17	18	19	20	21	22	23	24	25	26	27	28	29
MARR-ALL	CHLD-ALL	TOTAL	TAX_BASE	WAGES	INCOME_C LASS	10%	20%	25%	30%	37%	TAX_ LIABILITY	TAX_ CALCULAT ED	ETR
Marriage Allowance	Children Allowance	All Allowances	Chargeable Income	Total Income	Income Class	First Income Bracket	Second Income Bracket	Third Income Bracket	Fourth Income Bracket	Fifth Income Bracket	Tax Liability	Tax Payable	Effective tax rate over wages
517.9	-	19,992.60	18,399.60	44,128.98	4	300	600	1,899.99	1,439.90	-	4,239.89	4,239.89	9.61%
1035.8	-	20,491.40	17,788.60	44,000.00	4	300	600	1,899.99	1,256.58	-	4,056.57	4,056.57	9.22%
1,035.80	-	20,466.20	17,665.10	43,829.08	4	300	600	1,899.99	1,219.55	-	4,019.54	4,019.54	9.17%
-	-	19,214.20	17,645.60	42,367.59	4	300	600	1,899.99	1,213.70	-	4,013.69	4,013.69	9.47%
517.9	-	19,677.70	16,862.30	42,000.00	4	300	600	1,899.99	978.7	-	3,778.69	3,778.69	9.00%
1,035.80	-	20,195.60	16,344.40	42,000.00	4	300	600	1,899.99	823.32	-	3,623.31	3,623.31	8.63%
1,035.80	776.9	20,972.50	15,567.50	42,000.00	4	300	600	1,899.99	590.26	-	3,390.25	3,390.25	8.07%
1,035.80	-	19,899.80	14,900.20	40,000.00	4	300	600	1,899.99	390.06	-	3,190.05	3,190.05	7.98%
1,035.80	-	19,456.10	12,733.90	37,000.00	4	300	600	1,683.47	-	-	2,583.47	2,583.47	6.98%
1,035.80	-	19,308.20	12,011.80	36,000.00	4	300	600	1,502.94	-	-	2,402.94	2,402.94	6.67%
1,035.80	-	19,308.20	12,011.80	36,000.00	4	300	600	1,502.94	-	-	2,402.94	2,402.94	6.67%
1,035.80	-	19,308.20	12,011.80	36,000.00	4	300	600	1,502.94	-	-	2,402.94	2,402.94	6.67%
-	-	18,235.40	12,867.10	35,750.00	4	300	600	1,716.77	-	-	2,616.77	2,616.77	7.32%
517.9	-	18,505.90	11,140.80	34,076.63	4	300	600	1,285.20	-	-	2,185.20	2,185.20	6.41%
1,035.80	-	18,864.50	9,845.50	33,000.00	4	300	600	961.37	-	-	1,861.37	1,861.37	5.64%
1,035.80	-	18,687.10	8,978.90	31,800.00	4	300	600	744.74	-	-	1,644.74	1,644.74	5.17%
1,035.80	-	18,620.50	8,654.00	31,350.00	4	300	600	663.5	-	-	1,563.50	1,563.50	4.99%
1,035.80	-	18,462.30	7,881.70	30,280.52	4	300	600	470.43	-	-	1,370.43	1,370.43	4.53%
-	-	17,399.80	8,787.20	30,100.00	4	300	600	656.8	-	-	1,596.80	1,596.80	5.30%
1,035.80	-	18,427.70	7,712.60	30,046.28	4	300	600	428.14	-	-	1,328.14	1,328.14	4.42%

Appendix E. Sample of Database for Tax Calculation and Effective Tax Rate of Fifth Class of Income in Current Tax System

Appendix E.1

Taxpayer ID	Marital Status	No. of Children	More Than 3 children	Third Child	Child With 18<age<27 , at Full Educ.	Unmarried Child<20 yrs. 2th Scholl	Unmarried Child<16	Wages and Salaries	Social Security	Provident fund	Social Contribution	Gross Earnings	Personal Allowances	Special Allowances	Marriage Allowance
TAX_ID	MAR_ST ATUS	MO_CLD	5%	15%	11%	8%	6%	WAGES_SAL	9% WAGE	4% WAGE	S.S*P.F	GE	P.A	17% G.E	MAR-ALL
3	M	0	0	0	0	0	0	1,243,677.70	111,931.00	49,747.10	161678	1082000	12948	183940	1,035.80
13	M	0	0	0	0	0	0	530,643.80	47,757.90	21,225.80	68984	461660	12948	78482	1,035.80
26	M	0	0	0	0	0	0	335,600.00	30,204.00	13,424.00	43628	291972	12948	49635	1,035.80
64	M	0	0	0	0	0	0	215,731.60	19,415.80	8,629.30	28045	187687	12948	31907	1,035.80
93	M	2	0	0	2	0	0	180,000.00	16,200.00	7,200.00	23400	156600	12948	26622	1,035.80
99	M	0	0	0	0	0	0	178,259.80	16,043.40	7,130.40	23174	155086	12948	26365	1,035.80
156	M	4	1	1	2	0	0	150,000.00	13,500.00	6,000.00	19500	130500	12948	22185	1,035.80
167	M	0	0	0	0	0	0	145,840.20	13,125.60	5,833.60	18959	126881	12948	21570	1,035.80
197	M	0	0	0	0	0	0	137,000.00	12,330.00	5,480.00	17810	119190	12948	20262	1,035.80
272	M	2	0	0	1	0	1	120,000.00	10,800.00	4,800.00	15600	104400	12948	17748	1,035.80
298	M	3	0	1	1	1	0	125,500.00	11,295.00	5,020.00	16315	109185	12948	18561	1,035.80
445	M	1	0	0	0	1	0	90,000.00	8,100.00	3,600.00	11700	78300	12948	13311	1,035.80
568	M	0	0	0	0	0	0	79,763.00	7,178.70	3,190.50	10369	69394	12948	11797	1,035.80
812	M	2	0	0	1	0	1	66,000.00	5,940.00	2,640.00	8580	57420	12948	9761	1,035.80
865	S	0	0	0	0	0	0	63,514.20	5,716.30	2,540.60	8257	55257	12948	9394	-
870	W	0	0	0	0	0	0	63,243.50	5,691.90	2,529.70	8222	55022	12948	9354	517.9
1256	S	0	0	0	0	0	0	54,000.00	4,860.00	2,160.00	7020	46980	12948	7987	-
1450	M	1	0	0	0	1	0	52,000.00	4,680.00	2,080.00	6760	45240	12948	7691	1,035.80
1742	M	1	0	0	0	1	0	48,000.00	4,320.00	1,920.00	6240	41760	12948	7099	1,035.80
2169	M	1	0	0	0	0	1	45,000.00	4,050.00	1,800.00	5850	39150	12948	6656	1,035.80

Appendix E.2

	17	18	19	20	21	22	23	24	25	26	27	28	29
Children Allowance	All Allowances	Chargeable Income	Total Income	Income Class	First Income Bracket	Second Income Bracket	Third Income Bracket	Fourth Income Bracket	Fifth Income Bracket	Tax Liability	Tax Payable	Effective tax rate over wages	
CID_ALL	TOTAL	TAX_BASE	WAGES	INCOME_CLASS	10%	20%	25%	30%	37%	TAX LIABILITY	TAX CALCULATED	ETR	
-	197,923.80	884,075.90	1,243,677.74	5	300	600	1,899.99	3,015.00	318,357.58	324,172.57	324,172.57	26.07%	
-	92,466.10	369,194.00	530,643.79	5	300	600	1,899.99	3,015.00	127,851.31	133,666.30	133,666.30	25.19%	
-	63,619.10	228,352.90	335,600.00	5	300	600	1,899.99	3,015.00	75,740.10	81,555.09	81,555.09	24.30%	
-	45,890.50	141,796.00	215,731.63	5	300	600	1,899.99	3,015.00	43,714.02	49,529.01	49,529.01	22.96%	
2,848.60	43,454.40	113,145.60	180,000.00	5	300	600	1,899.99	3,015.00	33,113.39	38,928.38	38,928.38	21.63%	
-	40,348.50	114,737.50	178,259.77	5	300	600	1,899.99	3,015.00	33,702.40	39,517.39	39,517.39	22.17%	
5,438.20	41,607.00	88,893.00	150,000.00	5	300	600	1,899.99	3,015.00	24,139.92	29,954.91	29,954.91	19.97%	
-	35,553.60	91,327.40	145,840.24	5	300	600	1,899.99	3,015.00	25,040.65	30,855.64	30,855.64	21.16%	
-	34,246.10	84,943.90	137,000.00	5	300	600	1,899.99	3,015.00	22,678.74	28,493.73	28,493.73	20.80%	
2,201.20	33,933.00	70,467.00	120,000.00	5	300	600	1,899.99	3,015.00	17,322.30	23,137.29	23,137.29	19.28%	
4,402.30	36,947.60	72,237.40	125,500.00	5	300	600	1,899.99	3,015.00	17,977.35	23,792.34	23,792.34	18.96%	
1,035.80	28,330.70	49,969.30	90,000.00	5	300	600	1,899.99	3,015.00	9,738.16	15,553.15	15,553.15	17.28%	
-	25,780.80	43,613.00	79,762.97	5	300	600	1,899.99	3,015.00	7,386.33	13,201.32	13,201.32	16.55%	
2,201.20	25,946.40	31,473.60	66,000.00	5	300	600	1,899.99	3,015.00	2,894.75	8,709.74	8,709.74	13.20%	
-	22,341.70	32,915.60	63,514.17	5	300	600	1,899.99	3,015.00	3,428.28	9,243.27	9,243.27	14.55%	
-	22,819.60	32,202.20	63,243.46	5	300	600	1,899.99	3,015.00	3,164.32	8,979.31	8,979.31	14.20%	
-	20,934.60	26,045.40	54,000.00	5	300	600	1,899.99	3,015.00	886.31	6,701.30	6,701.30	12.41%	
1,035.80	22,710.50	22,529.50	52,000.00	5	300	600	1,899.99	2,678.87	-	5,478.86	5,478.86	10.54%	
1,035.80	22,118.90	19,641.10	48,000.00	5	300	600	1,899.99	1,812.35	-	4,612.34	4,612.34	9.61%	
776.9	21,416.20	17,733.80	45,000.00	5	300	600	1,899.99	1,240.15	-	4,040.14	4,040.14	8.98%	

