

MTA Corporate Income Tax Simulation Model

Introduction

An important part of making changes to the corporate tax system is the analysis of the impacts of changes to the system on corporate income tax (CIT) revenues. These impacts are a result of both direct and indirect impacts associated with the tax changes. The latter impacts result from the response of taxpayers in terms of their level of economic activity to such tax changes and the resulting change in CIT revenues. The direct impacts are computed under the assumption that there is no economic response of taxpayers to tax changes. The current document provides a description of model that has been developed of the Mongolian CIT system to estimate the direct impacts of tax changes. This model represents a first step in developing a system that is able to examine both the direct and indirect impacts of tax changes.

The next section of the document describes the general structure of the model and its calibration to the latest set of CIT data. The third section provides examples of how to conduct simulations using the model. The final section provides some concluding comments on the model and its use.

The CIT Model

The CIT model is an example of what is often called a “Tax Form” model. These types of models simply implement the tax form used by taxpayers to compute their tax payable to the government. The model is able to compute CIT payable for each taxpayer or a sample of taxpayers in the economy. The inputs to the model are the various revenue, expense, exemptions, credits, and tax rates required for tax calculation by the MTA. These tax parameters are included in the tax form. Changes in the tax parameters result in changes in CIT payable for each taxpayer and the tax system as a whole.

There are no “behavioral” equations in the model – those that would specify the reaction of taxpayers to changes in the various tax provisions. The model evaluates the CIT impacts under the assumption that taxpayers do not respond to tax changes – it only examines the direct impacts mentioned above.

Given CIT information for all taxpayers in the economy, the model exactly reproduces CIT revenues. The equations in the model represent “technical” relationships specified in the tax code. The model is not subject to error, given the assumptions employed about taxpayers. In the current application of the model, this assumption corresponds to the assumption that the historical data provided are correct. If the model was to be used for forecasting – which is not suggested in its current form because of the large amount of data required – errors in CIT revenue forecasts would not be a result of the structure of the model, but errors in the inputs used by the model.

The model is implemented in an Excel spreadsheet. The tax form categories are listed across the columns of the spreadsheet and the information about the taxpayers is listed down the rows of the spreadsheet. The tax form categories and their Excel spreadsheet

addresses are shown in the table below. The rows in the table are the headings used in the tax form spreadsheet. For some categories, two or more cell addresses are shown. The additional cell addresses refer to the cell locations of the tax rates or other parameters used to compute the respective assessed tax values. The bolded rows in the table refer to cells that make calculations in the model. These calculations are either ones that sum up categories or compute assessed tax values.

The Tax Form Categories

Category	Cell Address
1. Gross taxable income (1.1+ ... +1.13)	H
1.1 Basic Work & Services	I
1.2 Auxiliary Work & Services	J
1.3 Income from commercial banks & credit transactions	K
1.4 Income from insurance operations	L
1.5 Income from brokerage & stock exchange operations	M
1.6 Income from pawnshops	N
1.7 Income from disposal of movable property	O
1.8 Income from interest on loan	P
1.9 Income from leasing property	Q
1.10 Income from intermediary activities	R
1.11 Income from foreign currency exchange	S
1.12 Payment for guarantee	T
1.13 Other taxable income	U
2. Total exempted income (2.1 + ... + 2.8)	V
2.1 Income from interest on Government loans	W
2.2 Tax and donations by members or supporters of non-state organizations	X
2.3 Donor's blood products	Y
2.4 Income of social insurance fund & social care fund	Z
2.5 Income of the Mongol Central Bank	AA
2.6 Income of non-government organizations with state registry which serves the public	AB
2.7 Expenses on construction and maintenance of international, national, local roads and road infrastructure facilities deductible from the gross taxable income	AC
2.8 A foreign investor reinvest its income in the entity again then the taxable income of the concerned business entity shall be subject to deduction amounting to such reinvestment	AD
3. Total expenses deducted from taxable income (3.1 + ... + 3.32)	AE
3.1 Salaries and wages	AF
3.2 Official business trip expenses	AG
3.3 material expense	AH
3.4 raw material	AI
3.5 basic and auxiliary materials	AJ
3.51 Semi processed materials	AK
3.6 Package & wrapping expense	AL
3.7 Energy	AM
3.8 Steam, water, heating	AN
3.9 Fuel, petroleum	AO

3.10 Spare parts	AP
3.11 Health insurance premium	AQ
3.12 Social insurance premium	AR
3.13 Depreciation of fixed assets	AS
3.14 Expenses for current repair	AT
3.16 Bonus allocated for building construction budget	AU
3.17 Foreign currency loss	AV
3.18 Payment for work and services done by others	AW
3.19 Payment of rent	AX
3.20 Interest on loan paid in time	AY
3.21 Administrative expenses fixed by owners of property	AZ
3.22 Transport facilities and vehicle tax	BA
3.23 Payment for use of natural resources and land	BB
3.24 Excise tax paid to the budget	BC
3.25 Postal and communication expenses	BD
3.26 Transport rent	BE
3.27 Capital consolidated into bank's loan risk reserve fund	BF
3.28 Advertising and promotion expenses	BG
3.29 Training and retraining of staff costs	BH
3.30 Premium on compulsory and voluntary insurance	BI
3.31 Reserve fund founded by Insurance organization on given year	BJ
3.32 Other expenses	BK
4. Total taxable income (1 - 2 - 3)	BL
5. Correction of taxable income (6+7)	BM
6. Advertising and promotional expenses and training, retraining costs surpassed 5% of the gross taxable income	BN
7. Amount surpassed the administrative expenses fixed by owners of property	BO
8. Final total taxable income (4 + 5)	BP
9. Assessed tax	BQ,B1,B2,B3
10. Tax exemptions and credits (10.1 + ... + 10.9)	BR
10.1 Income, or it's transfer to abroad, derived from the sale of share products by a foreign company, which is carrying on business in Mongolia in accordance with product sharing contract concluded with the Government of Mongolia in oil sector	BS
10.1 Income, or it's transfer to abroad, derived from sale of share products by a foreign company, which is carrying on business in Mongolia in accordance with product sharing contract concluded with the Government of Mongolia in oil sector	BT
10.2 The economic entities engaged in manufacturing cereals, potato and vegetables are allowed to reduce taxable income of the above-mentioned activities by 50%	BU
10.3 A business entity which invests to construction of electricity source and network, and technology renovation shall enjoy income tax exemption to the extent of the invested amount for 10 years after its establishment and 50% tax relief in the subsequent 5 years	BV
10.4 Power and thermal plants and transmission network thereof, highways, railways, airway and engineering constructions, basic network of telecommunications-10 years of tax exemption and 50% tax relief in the subsequent 5 year period	BW
10.5 Mining and processing of mineral resources /except precious metals/, oil and coal, metallurgy, chemical production, machinery, electronics-5 years of tax exemption and 50% tax relief in the subsequent 5 year period	BX

10.6 Should a business entity with foreign investment in the area other than mentioned above exports more than 50 percent of its production, then it will receive tax exemption for 3 years and 50% tax relief in the subsequent 3 year period	BY
10.7 A corporation that is newly established with the purpose of production and service in an Aimag's territory, which has the potential for developing manufacture and service, and registered with the Aimag's tax office economic entity and organization, is fully exempt from corporate income tax for the first year and such corporation is relieved from corporate income tax at a 50 percent rate for the subsequent 2 years.	BZ
10.8 A corporation that is newly established with the purpose of production and service in an Aimag's territory, which has less potential for developing manufacture and service, and registered with the Aimag's tax office economic entity and organization, is fully exempt from corporate income tax for the first year. And such corporation is relieved from corporate income tax at a 75 percent rate for the subsequent 2 years.	CA
10.9 A corporation that is newly established with the purpose of production and service in an sum's territory, more than 100 km. distant from the Aimag's center, which has less potential for developing manufacture and service, and registered with the Aimag's tax office economic entity and organization, is fully exempt from corporate income tax for the first 2 years. And such corporation is relieved from corporate income tax at a 50 percent rate for the next years.	CB
11. Payable tax (9 - 10)	CC
12. Tax amount imposed by special rates (13+14+15+16+17+18)	CD
13.1 Income from disposal of immovable property	CE
13.2 Deducted expense	CF
13.3 Taxable income (13.1 - 13.2)	CG
13. Assessed tax (13.3*2%)	CH,B7
14.1 Income from royalties	CI
14.2 Deducted expense	CJ
14.3 Taxable income (14.1 – 14.2)	CK
14. Assessed tax (14.3*10%)	CL,B5
15.1 Income from dividends and gains of shareholder's	CM
15.2 Deducted expense	CN
15.3 Taxable income (15.1 – 15.2)	CO
15. Assessed tax (15.3*15%)	CP,B4
16.1 Income from lotteries, quizzes and games	CQ
16.2 Deductible expense	CR
16.3 Taxable income (16.1 – 16.2)	CS
16. Assessed tax (16.3*40%)	CT,B6
17.1 Income from interests on bank deposits	CU
17.2 Deducted expense	CV
17.3 Taxable income (17.1 – 17.2)	CW
17. Assessed tax (17.3*15%)	CX,B8
18.1 Transferred profits by permanent establishments	CY
18.2 Deducted expense	CZ
18.3 Taxable income (18.1 – 18.2)	DA
18. Assessed tax (18.3*20%)	DB,B9
19. Tax Payable (11 + 12)	DC

Gross taxable income is computed as the sum of the different categories of income in the tax form – 1.1 to 1.13. The values for the latter categories are inputs to the model. Gross taxable income is computed as the sum of the categories in the spreadsheet – SUM(I..U).

Total exempted income is the sum of the categories 2.1 to 2.8 – SUM(W..AD). The categories are inputs to the model. Similarly, **total expenses to be deducted from gross taxable income** are the sum of allowable expenses, the latter being model inputs – SUM(AF..BK).

Total taxable income is defined as the difference between gross taxable income and total exempted income and total expenses – H - V - AE.

A **correction is made to taxable income** for excess expenses. The total of such expenses is the sum of category 6 and 7 – BN + BO.

Final total taxable income is computed as total taxable income plus corrections, which is the sum of categories 4 and 5 – BL + BM.

The calculation of **assessed tax on final total taxable income** uses the tax brackets and corresponding tax rates. The tax rate for income less than or equal to \$100 million is 15%. Corporations earning in excess of Tg 100 million pay 15% on the first Tg 100 million and 40% on the additional income.

The tax bracket of Tg 100 million is stored in cell B1. The low tax rate is stored in cell B2 and the high tax rate is stored in B3. The computation of tax in cell BQ in the spreadsheet is as follows:

=IF(BP>B1,B1*B2+(BP-B1)*B3,IF(BP>0, B2*BP,0))

In this formula a check is made to ensure that the tax rate is not applied to negative taxable income.

Total tax exemptions and credits are computed as the sum of categories 10.1 to 10.9 – SUM(BS..CB). The exemptions and credits categories are inputs to the model.

Payable tax for the categories of income considered so far is computed as the difference between assessed tax and total exemptions and credits, 9 + 10 – BQ - BR in the spreadsheet.

Taxes imposed by special rates are computed as the sum of the different categories of these taxes, (13+14+15+16+17+18) – CH+CL+CP+CT+CX+DB.

Each of these taxes is computed as the product of taxable income and the corresponding tax rate. Taxable income is defined as the difference between income and expenses. For example, taxable income from royalties is defined as the difference between income, 14.1

and expenses 14.2. Assessed tax is then the product of taxable income and the corresponding tax rate. In the spreadsheet this calculation is:

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=IF(CK>0,CK*B5,0)
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where CK is the taxable income column and B5 is the tax rate location. In this formula, a check is made to ensure that the tax rate is not applied to negative taxable income.

Once the special tax categories are computed **Tax Payable** is computed as the sum Payable tax, 11, and the tax amount for special rates, 12 – CC+CD.

The data used to implement the model are those corresponding to the tax filers for 2001. The required data were extracted from the MTA CIT data base and placed in the Excel spreadsheet for the model. The model's calculations were checked with these data to ensure that they corresponded to the actual tax data. Corrections were made to both cell calculations and the data base to correct data entry errors during this process.

Conducting Policy Simulations

The CIT model can be used to conduct policy simulations through making changes to the tax rates and formulas in the model as well as modifications to the various deductions and exemptions. When conducting simulations it is important to ensure that changes are being made in the correct place in the model and in the correct manner. This section discusses how to conduct and view the results of tax policy impact studies.

Tax Rate Changes

Changes to tax rates are the simplest ones to conduct with the model. The tax rates for the various categories are shown at the top of the spreadsheet in column B. To evaluate the impact of a change in the tax rate, the model user simply needs to change the tax rate. For example, the tax rate for income from interest on bank deposits is in cell B8. The current rate is 15%. To change the rate to 10%, simply enter this value in cell B8. The cells in the spreadsheet will then be re-calculated to provide the new tax payable.

Other Changes

The other aspects of the tax system that can be changed are the various deductions and exemptions. These deductions can be completely or partially eliminated or increased. To accomplish such changes, how the particular category feeds into the tax calculations must be changed. For example, to eliminate the income exemption for income on government loans, the model user can either set the entire column of values to zero – column W – or exclude the column from the formula for the sum of such exemptions – modify the formula in column V to exclude column W.

If the model user wishes to incorporate new exemptions or deductions then a column(s) must be added to the spreadsheet in the appropriate place along with the likely values for the column(s). Such information is not provided in the model. The model user will need to estimate the values from other sources of information.

Viewing Impact Results

At present the spreadsheet containing the model contains three additional columns at the end of the spreadsheet that allow the model user to compare the results of the simulations to the “base case” values. The latter values are the payable tax values before changes are made. They are contained in column DD – Original Tax Payable. Column DE contains the difference between the Computed Tax Payable – the new tax payable – and the Original Tax Payable – the base case. Column DF contains the percentage difference between the new and base case values.

On the second sheet of the spreadsheet the model results are sorted by industry categories. Using this sheet tax changes can be viewed by industry as well as for the economy as a whole. This sheet is linked to the first sheet so changes in the first sheet automatically show up in the second sheet.

Additional aggregations can be made with the spreadsheet. For example, the model user could set up a sheet that aggregates the results by Aimag. The results could be sorted within each Aimag by industry.

Example Simulations

To illustrate how the model works, three simulations are conducted here. The first simulation changes the top income tax rate from 40% to 30%. The second simulation considers the impact of raising capital depreciation rates that leads to a 10% increase in the depreciation of fixed assets expense. The third simulation computes the impact of raising excise taxes 10%.

A 30% CIT Rate

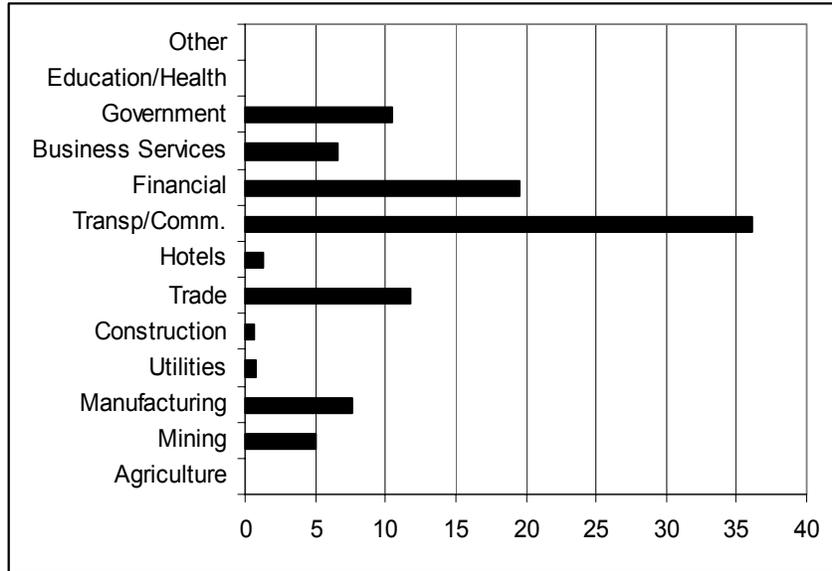
This change is examined by lowering the 40% tax rate on taxable income to 30%. It is implemented in the model by entering 30% in cell B3. The results of this simulation as applied to 2001 tax returns suggest a loss in CIT revenues of Tg 7.3 billion, which amounts to about 15% of CIT revenues.

The impact of the tax reduction across major industry categories is shown in the figure below. This figure shows the percentage of the total tax loss originating from each major industry category. As can be seen from the figure, the largest losses of CIT revenues are from the communications and transportation industry, financial services, and the trade industries.

A 10 Percentage Point Increase in the Depreciation Expense

An increase in depreciation rates for capital is the subject of this simulation. In this case, it is assumed that depreciation rates are raised in such a manner that overall industry depreciation expenses increase 10%. To accurately calculate the impact of depreciation rate changes, it is necessary to have information on the stock of un-depreciated balances by major category and to compute the changes in depreciation through changes in the rates applied to these balances. This simulation assumes that this has been done and the increase in the expense is 10%.

**Industry Impact of a 30% Corporate Tax Rate on CIT Revenues
(Percent of Total Tax Loss)**



This change is made to the model through adding 10% of the existing depreciation expenses to the total expense column AE. In this case the formula for total expenses in column AE is modified as follows:

$$=SUM(AF..BK) + 0.1*AS$$

where AS is the depreciation column. The model user could also insert a new column in the spreadsheet that has 10% higher depreciation expenses.

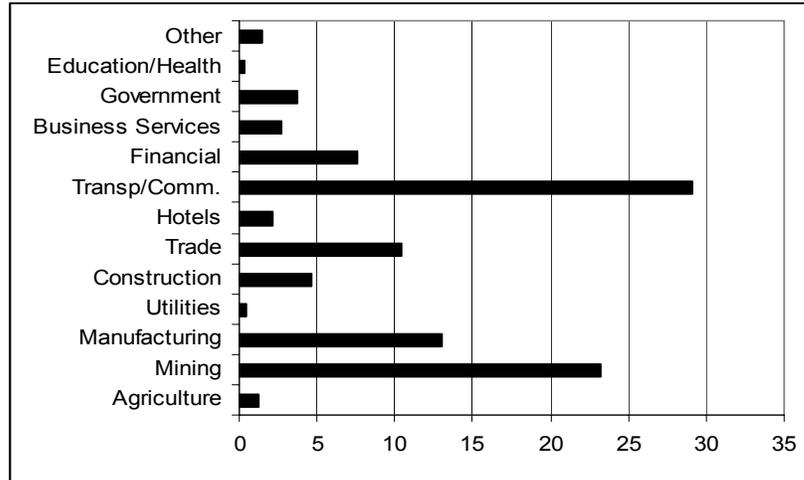
The impact of the increase in depreciation expenses is to reduce overall CIT revenues Tg 875 million or 1.8 percent of CIT revenues. The impact across the industry categories is shown in the figure below.

As can be seen from the figure, the communications and transportation, mining, and manufacturing sectors are the sectors where the largest proportion of the tax loss occurs. It is also those industries that are relatively capital intensive and the largest increase in investment is occurring.

A 10% Increase in Excise Taxes

This simulation illustrates the impact on CIT revenues of a 10% increase in government excise taxes. It also illustrates what the net direct impact of this type of change would be on government excise and CIT revenues combined. Since excise tax revenues are deductible from taxable income, an increase in excise taxes will lead to a reduction in corporate tax revenues.

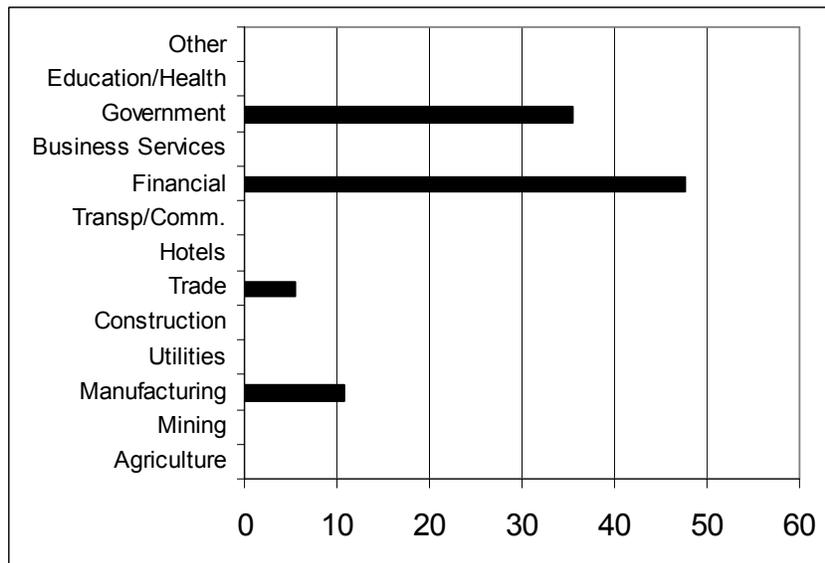
**Industry Impacts on CIT Revenues of a 10% Increase in Depreciation Rates
(Percent of Total Tax Loss)**



This tax change is made in an identical manner to that for depreciation expenses. An additional 10% of excise taxes is added to deductible expenses using column BC.

The results of the simulation show a reduction in corporate taxes of Tg 226 or 0.5 per cent of total CIT revenues. The increase in excise tax revenues is Tg 1,418 million. The net increase in CIT plus excise taxes is not Tg 1,416 million, but Tg 1,192 million. The industry impacts are shown in the figure below and reflect the proportion of excise taxes paid across the industry categories. Financial industries along with government ones are the major source of loss in CIT revenues.

**Industry Impacts on CIT Revenues of a 10% Increase in Excise Taxes
(Percent of Total Tax Loss)**



Concluding Comments

The current model provides a useful framework for examining the direct impacts of proposed tax changes for the CIT system. While it would be difficult to use for forecasting purposes, it can provide guidance as to possible changes in the system in the next couple of years. For example, the results of the reduction in the 40% tax rate to 30% could be used to adjust next year's forecast of CIT revenues under the assumption that the percentage reduction CIT revenues associated with the policy change in the last taxation year would be similar to what would happen next year. For short term forecasting where industry structures remain relatively constant this assumption would be more reasonable than over long periods of time where such structures can change noticeably.

There are some areas where information could be expanded for use in the model such as for depreciation expenses where information on un-depreciated balances by type would allow a more accurate modeling of rate changes. Other areas of such weakness will be identified as new tax changes are suggested and found not to be included in the model. Such changes will require work outside the model to establish reasonable assumptions for model usage. An example of this area is the inclusion of carry-over losses in the tax system

An important missing piece in the current modeling framework is the ability to estimate the indirect as well as direct impacts of policy changes. The development of such a framework or model would require the use of economic inputs through the use of a macroeconomic model that would produce industry responses to tax changes. A model that integrates the tax system with the economy is necessary in this case. The current model, nevertheless, can provide important guidance in using a model that incorporates both a fiscal and economic framework.