"The effects of fiscal policy in taxation constraint using the CGE model"

The Case study of Cambodia

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I. Introduction

Due to some Cambodia researchers rarely wish to use the Computing General Equilibrium (CGE), Because they think that there is less sources of data. Cambodia is developing countries while Cambodian economy maintained high growth of more than 10% p.a. for four years for 2004 to 2007. While GDP growth dropped to 0.1% in 2009, having hurt from world recession in the half of 2008, The growth rate in 2010 recovered up to 6%. Due to the MEF's forecast, the growth rates are estimated to persist between 6% and 6.5% in 2011 and 2012 (MEF).

Some major policy issues such as trade liberalization, taxation and reformed strategies should have been treated qualitatively and tax transparency in term of development in economy. Furthermore, I will run with interest rate too in GEMS software in order to know more how fiscal policy constrain tied with rate can effect to economy and lifestyle or not. To solve these issues, the paper will deploy methodologies used in estimating in the social Accounting Matrix (SAM) table and a construction and an application of the CGE model for Cambodia.

II. Macro-economic Performance and Taxation

The imported raw materials from China can make cheaper cost for Cambodia industry sector. The fiscal consolidation continues to improve with better tax collection which has made the huge revenue to government and prudential spending to surge fiscal buffering and strengthened public service deliveries. In quarterly 2015, domestic revenue was increased by 3.41% , 958.01 billion riels, compared to June 2014. This growth has been mainly driven by the performance of main firms such as the General Department of Taxation and General Department of Customs and Excise, accounted for about 15.8% and 5.81%, respectively . In June 2015, recent revenue accounted for 953.55 billion riels,was increased by 5.58% compared to 2014 in which tax revenue increased by 14.24 %. Overall, in the period of 6 months of 2015, totalized domestic revenues at central levels were 5.949,34 billion riels, higher than 3.37% of its target for 6 months (budget law), and upped by 17.60% compared to the same period in 2014, of which revenue collected by Department of Taxation boosted by 30.34% and Department of Customs and Excise went up by 14.14%. Total current revenue was calculated 5,912.53 billion riels, increased by 3.68% of target (law) for a period of 6 months and went up by 17.56%, led by an growth in tax accounted for 21.61%.

The improvement in fiscal performance is driven by tightening revenue accumulation through continued to strengthens of revenue collected on VAT and excise tax, particularly on cigarettes and with beer, integrates registered real estate data from Cadastral Administration into a database management system of GDT, combated the tax avoidance and incorporate estimated regime into formal (non-estimated) regime and strengthen auditing for enterprises (MEF).

Figure 1: GDP and its Sectoral Performance over 2004-2009

Sectors and subsectors	Growth rate			Shares of GDP			Contributions to Growth		
	Average 04-07	2008	2009	Average 04-07	2008	2009	Average 04-07	2008	2009
Agriculture, Fishery & Forestry	**6.2%**	**5.7%**	**5.4%**	**28.2%**	**26.5%**	**27.9%**	**1.8%**	**1.5%**	**1.4%**
Crops	9.2%	6.6%	5.8%	14.1%	14.0%	14.8%	1.3%	0.9%	0.8%
Livestock & Poultry	5.3%	3.8%	5.0%	4.5%	4.1%	4.3%	0.3%	0.2%	0.2%
Fisheries	2.1%	6.5%	6.0%	7.5%	6.6%	7.0%	0.2%	0.4%	0.4%
Forestry & Logging	3.5%	0.9%	1.1%	2.1%	1.8%	1.8%	0.1%	0.0%	0.0%
Industry	**13.9%**	**4.0%**	**-9.5%**	**27.6%**	**27.5%**	**24.8%**	**3.7%**	**1.1%**	**-2.6%**
Mining	18.3%	15.8%	20%	0.4%	0.4%	0.5%	0.1%	0.1%	0.1%
Manufacturing	13.4%	3.1%	-15.5%	20.3%	19.8%	16.7%	2.6%	0.6%	-3.1%
Electricity, Gas &Water	16.4%	8.5%	8.5%	0.5%	0.6%	0.6%	0.1%	0.0%	0.0%
Construction	15.3%	5.8%	5.0%	6.5%	6.6%	6.9%	0.9%	0.4%	0.3%
Services	**11.6%**	**9.0%**	**2.3%**	**38.4%8**	**39.1%8.**	**40.0%**	**4.5%**	**3.5%**	**0.9%**
Trade	7.7%	9.4%	4.2%	.6%	6%	8.9%	0.7%	0.8%	0.4%
Hotel & Restaurants	17.3%	9.8%	1.8%	4.3%	4.6%	4.7%	0.7%	0.4%	0.1%
Transport & Communications	8.3%	7.1%	3.9%	6.5%	6.1%	6.3%	0.6%	0.4%	0.2%
Finance	21.5%	19.2%	8.0%	1.2%	1.6%	1.7%	0.2%	0.3%	0.1%
Public Administration	-0.6%	4.5%	1.0%	1.4%	1.2%	1.2%	0.0%	0.1%	0.0%
Real Estate & Business	12.3%	5.0%	-2.5%	7.7%	7.5%	7.3%	0.9%	0.4%	-0.2%
Other services	16.4%	12.0%	2.9%	8.7%	9.6%	9.8%	1.3%	1.1%	0.3%
Taxes on Products less Subsidies	**20.7%**	**9.1%**	**6.1%**	**6.7%**	**8.2%**	**8.6%**	**1.3%**	**0.7%**	**0.5%**
Less: Subsidies	-11.1%	1.5%	1.9%	0.3%	0.1%	0.1%	0.0%	0.0%	0.0%
Less: Finance Service Charge	17.3%	14%	12.0%	1.0%	1.2%	1.3%	0.2%	0.2%	0.1%
Total GDP	**11.1%**	**6.7%**	**0.1%**	**100%**	**100%**	**100%**	**11.1%**	**6.7%**	**0.1%**

<u>Source:</u> Ministry of Economy and Finance

In June 2015, the interest rate movement of a 12-month maturity loans and deposits showed that the weighted average deposit rate in KHR decreased slightly by 0.003% while deposit in US Dollar increased by 0.01%. At the same time, the weighted average lending rate in KHR increased by 0.04% while lending rate in US dollar decreased by 0.01%.

Figure 1.1: Revenue collection (% of GDP)

Figure 1.2: Investment project approved by sectors (In USD million)

Sector	Agriculture		Industries		Services		Tourism		Total	
	Projects	Fixed Assets	Projects	Fixed Assets	Projects	Fixed Assets	Projects	Fixed Assets	Projects	Fixed Assets
2013										
Q4	8	829.5	44	1044	1	8.3	0	0	53	1881.80
Total	**15**	**997.9**	**142**	**3,349.60**	**2**	**29.5**	**1**	**106**	**160**	**4483.00**
2014										
Q1	1	23	38	204.2	3	55.8	2	163.3	44	446.30
Q2	5	37.4	40	230.7	2	98.9	1	15.4	48	382.40
Q3	3	32.7	33	280.1	2	44.8	4	268.1	42	625.70
Q4	2	35.3	13	114.6	0	0	0	0	15	149.90
Total	**11**	**128.4**	**124**	**829.6**	**7**	**199.5**	**7**	**446.8**	**149**	**1604.30**
2015										
Q1	4	270.8	27	97.9	4	2444	2	60.6	**37**	2873.30
Q2	3	74.5	21	94.5	2	85.6	0	0	26	254.60
Total	**7**	**345.3**	**48**	**192.4**	**6**	**2529.6**	**2**	**60.6**	**63**	**3127.90**

Source: National Bank of Cambodia
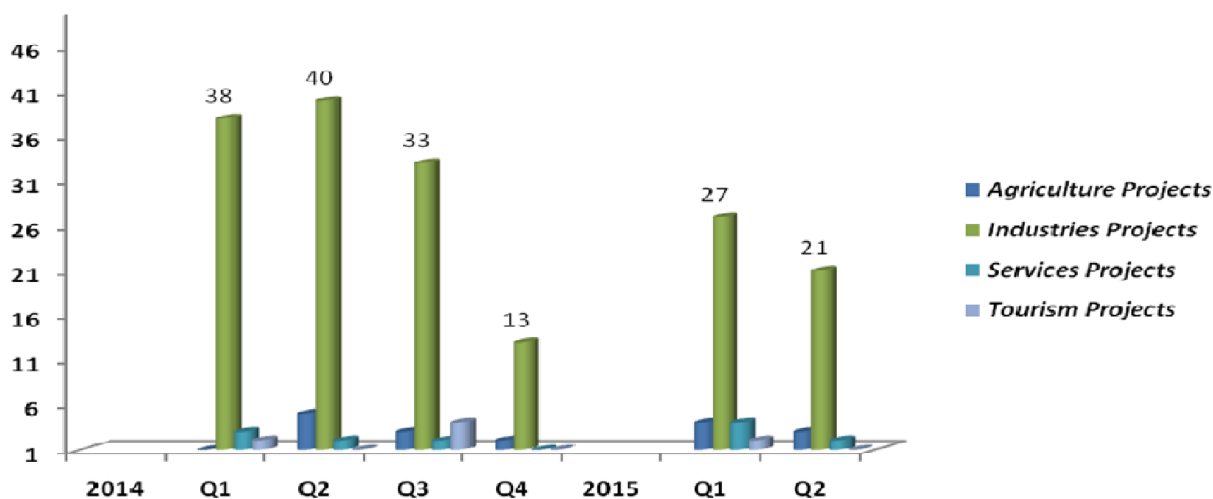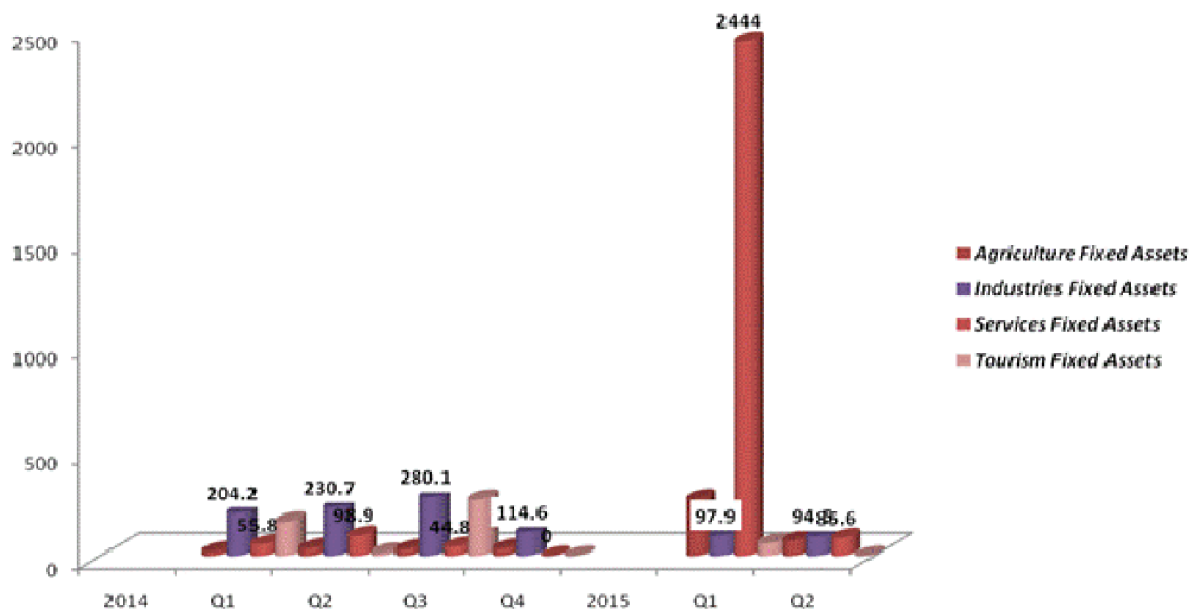
Figure 1.3: Investment Approved by CIB by Sector: 1994 – September 2011

		Agriculture	Industries	Services	Tourism	Total
1994-2005		344	3,147	1,800	2,386	7,677
	2006	505	987	2,171	777	4,440
	2007	371	338	653	1,294	2,656
	2008	95	726	1,292	8,776	10,889
	2009	590	958	410	3,901	5,859
	2010	554	946	1,059	132	2,691
	2011(1-9)	284	2,695	192	2,503	5,674
2006-2011(9)		2,399	6,650	5,777	17,383	32,209
Total (1994-2011.9)		2,743	9,797	7,577	19,769	39,886
Percentage		6.88%	24.56%	19.00%	49.56%	100.00%

Source: CDC

Furthermore, public expenditure has mentioned as following as:

Fiqure1.4: **Public Expenditure (% of GDP)**
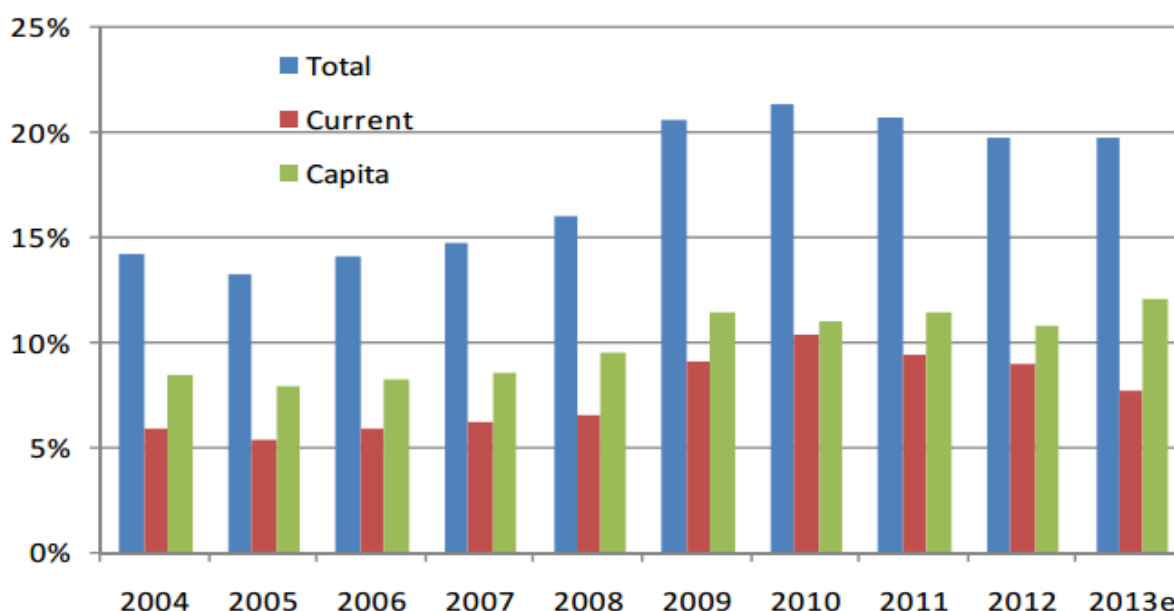
Source: Ministry of Economy and Finance

The Cambodia economy has been really active. The amount of major four sectors of Cambodia which is from 1994-2011 estimated to have grown by average 6.88% of agriculture in annuity. However, since1994 the major sectors have also kept growing, Industries surged around 24.56% in average level and services has remained in growth too about 19% and tourism about 49.56% since 1994 to 2005. This means that economy of Cambodia is much more easy to get risk while this economy was referred so much in tourism sector. That can be external shock in the world as well as world crisis or any crisis too.

III. Methodology and data

The prediction of an input-output table needs more extensive survey data on the structure of an economy. Cambodia Consequently, an input-output table has to be constructed by using

table(s) of a representative economy as a starting point to entire economy. The process of this form in Social Accounting Matrix (SAM) table added with Input-Output (I-O) table as:

Fiqure3: Schematic SAM table

	AGR-A	NAGR-A	AGR-C	NAGR-C	LAB	CAP	U-HHD	R-HHD	GOV	S-I	YTAX	STAX	TARIFF	ROW	TOTAL
AGR-A			PRODUCTION OUPUTS												
NAGR-A															
AGR-C	INPUT- OUPUT table						Consumption Expenditures			Invest				EXPORT	
NAGR-C															
LAB	Value added														
CAP															
U-HHD					FACTOR INCOMES		TRANSFER							TRANSFER	
R-HHD															
GOV											GOV'T INCOME				
S-I							SAVING							FOREIGN SAVING	
YTAX							INCOME TAX								
STAX			SALE TAX												
TARIFF			TARIFF												
ROW			IMPORTS												
TOTAL															

Source: lecture note 2015: Nattapong Puttanapong,PhD.

Whereas some variables as mentioned in full names as following:

Titles	Abstracts
AGRI Commodity	(AGRI-C)
NON- AGRI Commodity	NAGRI-C
AGRI activity	(AGRI-A)
NON-AGRI activity	(NAGR-A)
Urban household	Urban-HHD
Rural household	Rural-HHD
Sales Tax (STAX)	STAX
Income Tax (YTAX)	YTAX
Tariffs	TAR
Transfer from Rest of the World	(Row)
Government expenditure	Gov
Government Saving	Saving
Labor	LAB
Capital	CAP
Saving -Investment	S-I

This SAM table included as

1. 3 Sectors (Agriculture, Manufacturing, Service)
2. 2 Factors of production (Labor and Capital)
3. 1 Type of Household
4. 1 Type of Enterprise

5. Government with 3 types of tax and 1 subsidy item
6. International trade and transfer are included.

Main sources of data for Cambodia is from the Gtab2004, one of the leading data in world. Other data from the National Bank of Cambodia, Ministry of economic and Finance of Cambodia and other international organizations (the World Bank and IMF) are also used as secondary sources in this exercise.

Figure3.1: **General Tax rate for income**

Part of annual tax profits	Tax Rate
From 0 to 6,000,000 Riels	0%
From 6,000,001 to 15,000,000 Riels	5%
From 15,000,001 to 102,000,000 Riels	10%
From 102,000,001 to 150,000,000 Riels	15%
Greater than 150,000,000 Riels	20%

Source: General Department of Tax of Cambodia

However, the some multipliers are still via course set in CGE course and macroeconomic aggregates available for this SAM forecasted consists of the followings:
- GDP from entire income and expenditure of Cambodia
- Trade balance and fiscal policy in taxation
- Some industrial outputs
- Gross Value-added and backward and forward linkage
- Government transfer and Labor Income
- Tax Revenues and government investments

These raw data are deployed and processed by using EXCEL and GEMs programme for applying this forecast.

IV. Share Levels from each equations in GEMS

Due to distribute share level of the above sectoral aggregates into their corresponding sectors of GEMS, the data in SAM estimated and used. The levels are shown in the table followings. In these tables shown to which the distribution of each original sectoral share and classified well in three levels with marginal constraint.

1- Transfer of income from factor f to h-hold h

```
      LOWER    LEVEL    UPPER   MARGINAL

HHD.LAB    .      .      .    5959.099
HHD.CAP    .      .      .    25552.922
```

2- Income of household h

```
   LOWER    LEVEL    UPPER   MARGINAL

HHD  5747.540  5747.540  5747.540    0.094
```

3- Consumption demand for household h & commodity c

```
         LOWER    LEVEL    UPPER   MARGINAL
     AGR-C .HHD    .     .      .    21664.654
     NAGR-C.HHD    .     .      .     9873.801
```

4- Investment demand for commodity c

```
        LOWER     LEVEL    UPPER    MARGINAL

   AGR-C     .      .      .   17177.453
   NAGR-C    .      .      .   84952.007
```

```
               LOWER     LEVEL    UPPER    MARGINAL

   EQU GOVREV    16.500   16.500    16.500    17399.910
   EQU GOVEXP   5703.540  5703.540  5703.5   4075116.715
```

EQU FACTEQ market equilibrium condition for factor f

```
    LOWER    LEVEL    UPPER   MARGINAL
```

```
LAB    .      .      .    1.1331E-7
CAP -2.498E+4 -2.498E+4 -2.498E+4    1.009
```

5-Market equilibrium condition for composite commodity c

```
         LOWER     LEVEL    UPPER    MARGINAL

AGR-C    0.001     0.001    0.001     0.942
NAGR-C   551.927   551.927  551.927   24575.584
```

```
              LOWER     LEVEL    UPPER    MARGINAL

   EQU CURACC    -55.000  -55.000  -55.000    23945.671
   EQU SAVINV      .        .        .        13999.911
   EQU PNORM      1.024    1.024    1.024     54268.794
```

CURACC current account balance for RoW
SAVINV savings-investment balance
PNORM price normalization

```
             LOWER    LEVEL    UPPER   MARGINAL

   VAR EG        -INF    6264.948    +INF    .
   VAR FSAV      -INF    7748.574    +INF    .
   VAR IADJ      -INF    1.838       +INF    .
```

EG government expenditures
FSAV foreign savings (foreign currency)
IADJ investment adjustment factor

6- Domestic price of domestic output c

```
          LOWER    LEVEL    UPPER   MARGINAL
AGR-C     -INF     1.002    +INF      .
NAGR-C    -INF     0.986    +INF
```

7- Value-added price for activity a

```
          LOWER    LEVEL    UPPER   MARGINAL

AGR-A     -INF     0.507    +INF      .
NAGR-A    -INF     0.528    +INF      .
```

8- Producer price for commodity c

```
          LOWER    LEVEL    UPPER   MARGINAL

AGR-C     -INF     1.003    +INF      .
NAGR-C    -INF     0.986    +INF      .
```


V. Simulation of Macroeconomic of Cambodia and results from GAMS

Macroeconomic constrain in Cambodia has shown via SAM data in 2004. This means that this model is dynamic consisting of various sectors with extensive accounts of each sector. The model has been used extensively for the country's national account and income and expenditure estimation and forecast in other policy improvements in Cambodia.

Figure 4 is the controlled data2004 on GDP by Revenue and expenditure and estimated households demand and the government revenue due to taxation and entire imports and exports of goods and services and rest of the world. Note that this SAM data is due the economy of Cambodia in 2004. Furthermore, Cambodia government has expended so much while total revenue is less and need more the grants or external source loan in order to balance in the market annually due to this estimations table.

Whereas, the taxation from HHD and consumptions are still less investments and saving in markets, this means that the fiscal policy on taxation should be conducted more strictly in tax modernized collection and reform via using high technology as well. Total current revenue from tariff was 1798.827 million USD and tax from income about 10005.255 million USD. The reform in fiscal performance is driven by tightening revenue collection through strengthening of revenue collection on VAT and excise tax, especially on the on cigarettes and beer, integrate registered real estate data from Cadastral Administration into a database managerial system of GDT, combated the tax avoidance and incorporate estimated regime into formal regime and strengthen auditing for enterprises by using the updated knowledge and high technology to implement transparency and efficiency tax collection.

Figure 4: Simulation and forecast from SAM table

	AGR-A	NAGR-A	AGR-C	NAGR-C	LAB	CAP	HHD	GOV'T	S-I	YTAX	STAX	TAR	ROW	TOTAL
AGR-A			17351.869											17,351.87
NAGR-A				77637.948										77,637.95
AGR-C	2554.828	8623.961					7452.731	0.001	0.054				183.074	18,814.65
NAGR-C	6047.917	26878.438					33140.517	561.704	11999.015				9981.71	88,609.30
LAB	2625.883	23275.68												25,901.56
CAP	6123.241	18859.869												24,983.11
HHD				25901.563	24983.11			5703.54					40	56,628.21
GOV'T										10,005.26	2,251.45	1,798.83	15	14,070.53
S-I							6029.71	7913.922					(1,944.56)	11,999.07
YTAX							10005.255							10,005.26
STAX			882.841	1368.608										2,251.45
TAR				1798.827										1,798.83
ROW			579.94	7803.917										8,383.86
TOTAL	17,351.87	77,637.95	18,814.65	88,609.30	25,901.56	24,983.11	56,628.21	14,179.17	11,999.07	10,005.26	2,251.45	1,798.83	8,275.22	

Due to this above table mentioned that most of the government revenue which used the fiscal policy constrain as taxation are still limited if we compare to the government expenditure and this means that government can reach the goals assessment in annual referred to donor and external loans while tariff on AGR-C is not included too. Furthermore, the range of tax rate on 5%-12% and demand for factor f from activity agriculture sector which means that Labor in agriculture is still highly decreased around 26.26 and labor on non agriculture activities unsurged in upper level as 465.514.

Figure 5: Investment for consumption C with government revenue and expenditure in model

	LOWER	LEVEL	UPPER	MARGINAL
GOVREV	16.50	16.50	16.50	17,399.910
GOVEXP	5703.54	5703.54	5703.54	75,116.715
AGR-C	-	-	-	17,177.453
NAGR-C	-	-	-	84,952.007

Figure 5 detailed well about the government expenditure and revenue with the investment for consumption in commodity in Cambodia, This shows that the huge proportion of expenditure in upper level and less proportion of government revenue in upper level whereas, the agriculture and non agriculture commodity don't mention about it.

Fiqure6: Parameter checking the row and column sum of SAM table

```
AGR-A   5.000002E-6,    NAGR-A 1.000000E-5,    AGR-C   -4.70000E-6
NAGR-C -1.10000E-5,     LAB    3.63798E-12,    CAP     -6.00000E-6
HHD     5.000002E-6,    GOV        -108.637,    S-I    4.000000E-6
ROW        108.637
```

This figure 6 shows us as the imbalance of expenditure and revenue of government in term of spending in 2004 which is needed strongly with donor or borrowing external sources around 108.637 million dollars in this period while current account has decreased around 55 % in upper level of market equilibrium condition for composite commodity.

International Trade in Commodity in Cambodia

The major total exports of Cambodia in 2015 were Garment, Footwear, Rubber, Sawn Timber, Textile, and Fish Products; whereas the major components of total imports were Petroleum, Vehicles, Gold, Motor Bikes, Steel, Cigarettes, Construction Materials, Cement, Clothing, Beer, and Cloths.

Figure 7: international trade in commodity

Source: National Bank of Cambodia

While International trade in goods showed a deficit of KHR 746.4 billion (20.1%) in June, from the deficit of KHR 1,315.7 billion (35.2%) in May 2015 (NBC, 2015).

Figure 8: Tax revenue 2003 (Million US$)

	Export	*Import*	*Total*
VAT and turnover tax	79	36.5	116
Excise tax	41	8	50
Custom duties	94	5	99
Others	4	38	42
Total	219	88	307
Share of Total	0.7134	0.287	
Share of GDP	0.0483	0.0194	0.0677

Source: EIC complied from Ministry of Economy and Finance.

However, the figure 8 stressed that the share between export to GDP and Import to GDP are still quiet large to each others and share of total export and import too. This shows that Cambodia needs more SMEs or industries in NAGRI-A and NAGRI-C and as well as AGRI-A and AGRI-C too in order to push up the productions in domestic goods.

Furthermore, if we take a look at others in figure8 , we can know that the smuggling of the goods and other bias are still hug gap if we can compare to the real official reports. This because of some cases happened in the tax collection and the system of this tax regulation in Cambodia. Moreover, the corruption and other cases should also be included as well via this data report.

Figure 9: Simulation result 2004 (% change)

	5%	10%	15%	20%	25%	30%
SAVINING	-49.87%	-28.75%	-8.36%	12.35%	33.41%	54.85%
CURRENT ACCOUNT	2.84%	3.17%	3.54%	3.95%	4.39%	4.87%
GOV'T REVENUE	4.19%	3.10%	1.97%	0.79%	-0.43%	-1.70%
GOV'T EXPENDITURE	-0.71%	0.30%	1.34%	2.40%	3.49%	4.61%
HHD INCOME	-28.72%	-18.09%	-6.38%	5.32%	17.02%	32.98%
HHD Demand	-20.76%	-12.63%	-4.42%	3.88%	12.27%	20.77%
Investment	-1.68%	-0.36%	-0.36%	0.32%	1.02%	1.73%

Source: author's calculation from GTAB2004.

Figure 10: Graphic (%change)
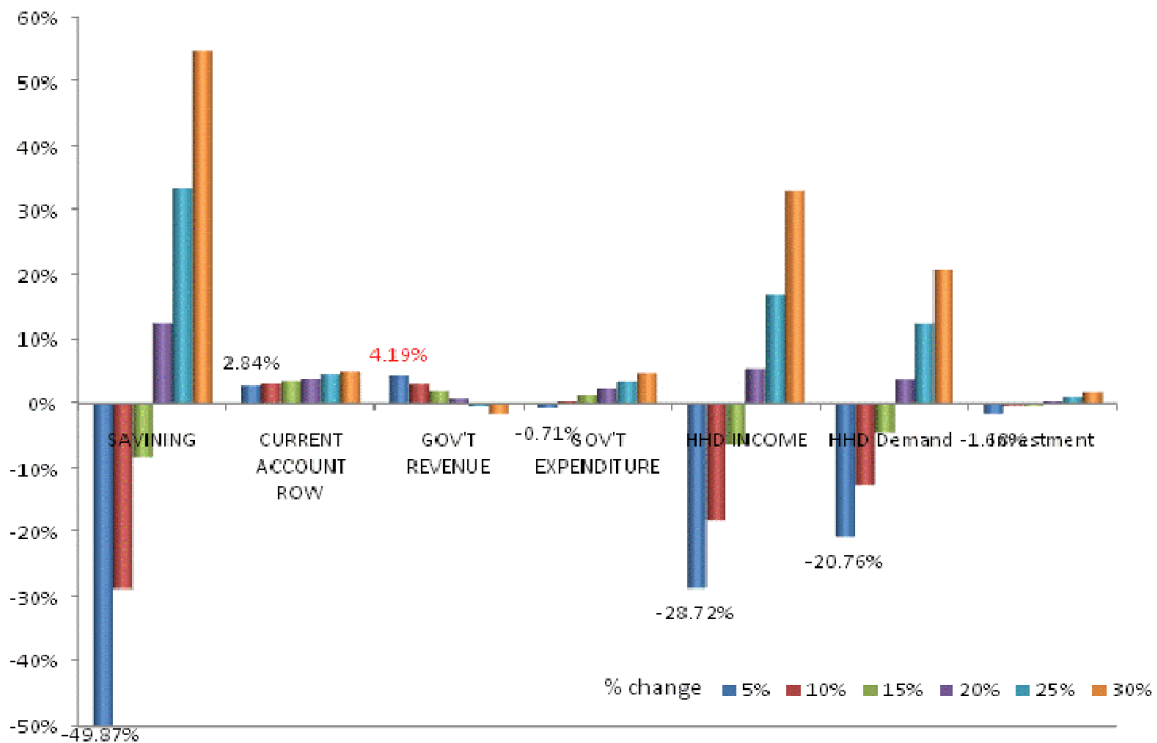
Source: author's calculation from GTAB2004.

Figure 11: Diagram and Result
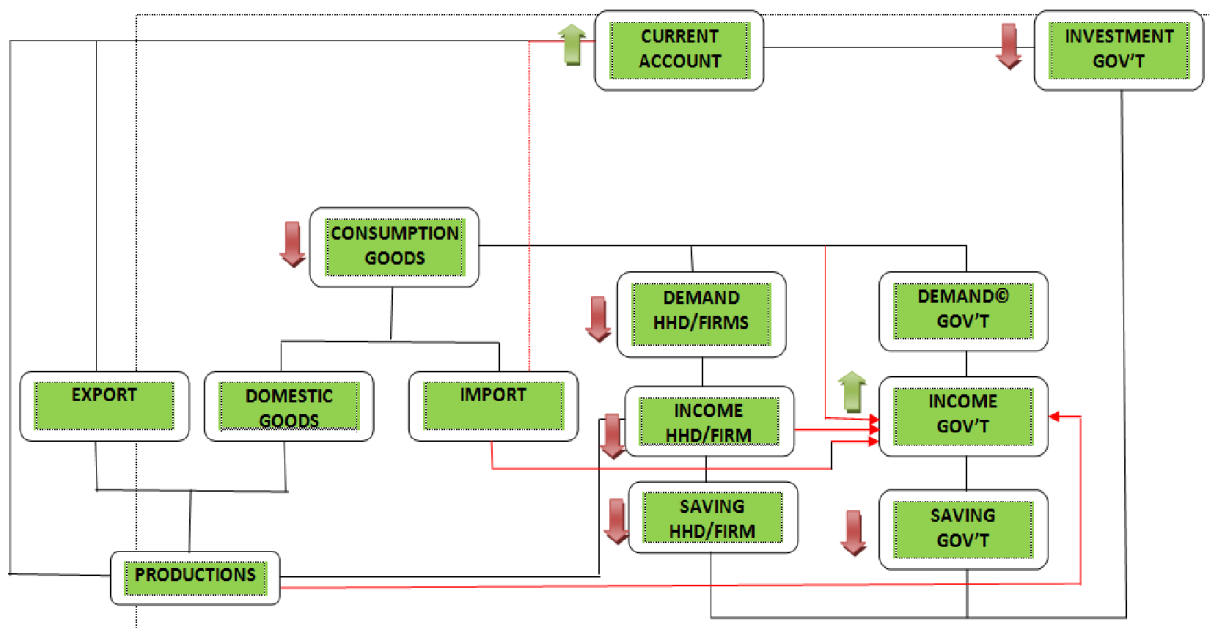
Source: author's calculation from GTAB2004.

VI. Conclusion and Policy Recommendation

By this simulation results, I have seen that government revenue is very high compared to other tax rate level in 5% of income tax rate per annum in order to get more revenue and this mentioned that most of the Cambodian labor has revenue around 125-300 per month which is 4.06-10 per day. Whereas poverty headcount ratio at $3.10 a day and corresponding $1.25 a day and $2 a day poverty lines (worldbank,2011).Due to this result, "effective tariff rates" is far below the official rates in figure 8. In addition due to above simulations mentioned that HHD annual income mostly levels in 5% scale salary as mentioned in figure 3.1 The Cambodia government should take immediate measures to respond to the effects of the fiscal policy in tax collection efficiency. However, it is important due to prevalence of smuggling and inefficiencies in tax collections. As a result, the estimated "effective tariff rates" is far below the official rates. It seems to be broad although it is difficult while income tax (Ytax) consists about 10,005.26 million dollars and government transfer equaled 45million dollars too , furthermore , consumption expenditures are covered around 41,154.95 million dollars in 2004.

However, in 2015, Cambodia's General Department of Taxation (GDT) collected $1.09 billion in taxes during the first 10 months in 2015, up 23.9% with to the same period a year earlier. This growth was increased tax revenue on vehicles, which highened 116% during the period, while taxes collected on tobacco grew 114.9 per cent. This means that the $1.09 billion tax revenue collected so far this year represents 93.7 per cent of 2015's annual tax revenue (GDT, 2015).

The government will try more in order to reform tax collection via unconventional fiscal policy to meet the ASEAN integration for coming monthes. Because of that opportunity will be pros and con to Cambodia as well as developing countries like deduction tax or tax

barrier and labor mobilization and capitalization in the market. Take force to tax regulation in order to reduce the smuggling and under table issues too. The updated knowledge and technology of tax collectors are also necessary to provoke to implement effectively to the fiscal policy and government revenue too.

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