

CHAPTER 4

RESULTS

4.1 Macroeconomic Indicators

The influence of carbon tax scenarios on GDP are depicted in Figure 4.1 that shows GDP change from BAU case in percentage change. As Figure 4.1 shows, the impact of its make GDP shrinking. In short term, the impact is more serious than long term since it could get some compensate with GDP driving factor in future such as investment, export growth and so on. In the low tax scenario (LT), GDP shrinks about 0.028 – 0.018% from year 1 to 10. GDP deducts from BAU about 0.085 – 0.072 in the average tax scenario (AT). Finally, in the high tax scenario (HT), it is shown that GDP has a reducing from base line about 0.14 – 0.12.

Likewise, The Consumers Price Index (CPI) under various carbon tax implementation policies is presented in Figure 4.2. In base case, the inflation rate has a declining growth rate in the future because it assumes that productivity of technologies improves when wage is constant. The effect of carbon tax induced in higher inflation rate. In all scenarios, CPI has higher magnitudes of increasing inflation rates in the earlier period and then decreasing in linear. In low carbon tax, CPI increase form 0.029 at the first period to 0.002 in the last period. For average tax, it is about 0.088 – 0.056% from BAU. In HT, the downtrend slope of magnitude of impact is about 0.004 in each year then it impact give about 0.15 to 0.114.

Figure 4.3 represents the percentage change from the base line of household consumption budgets for each scenario. It shows that the higher carbon tax implies the higher loss in household's disposable income. As a result, every one hundred baht change in carbon price will give negative impact on disposable income of household approximately 0.1% of disposable household income.

According to the results of BAU, the total government income growth accounts for around 4.3% per year. The result of the effect of carbon taxes on total government income is that the government absolutely receives more income when increasing carbon tax.

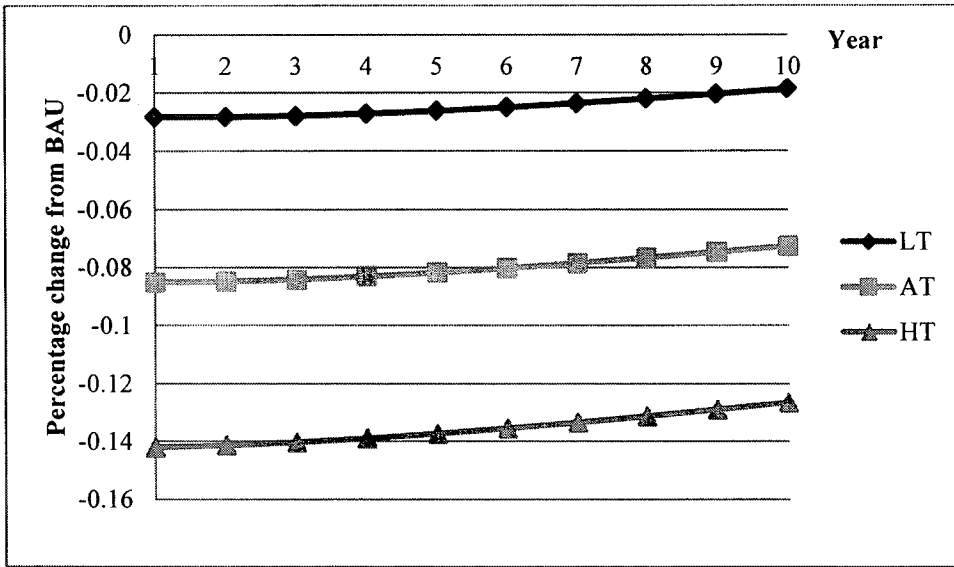


Figure 4.1 GDP in percentage change from BAU

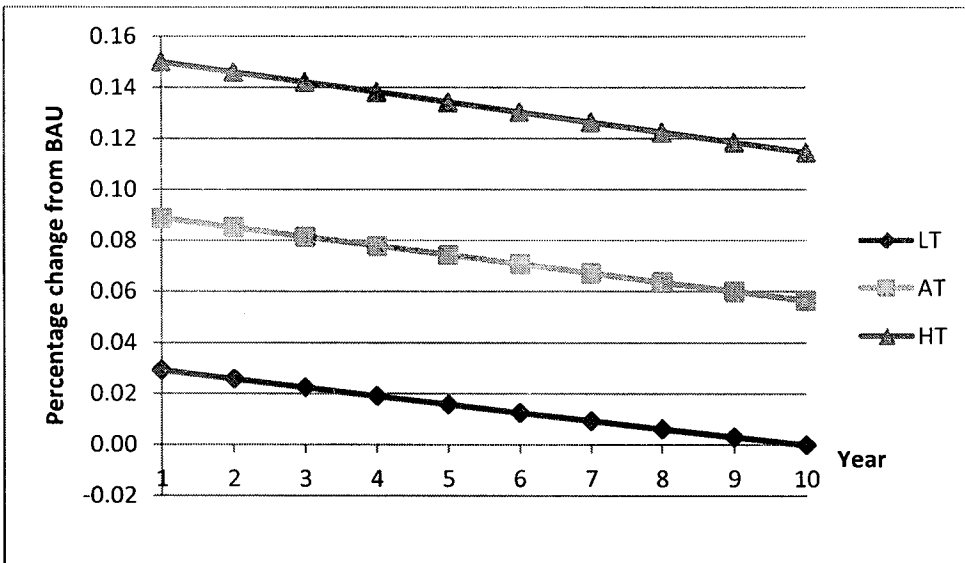


Figure 4.2 CPI in percentage change from BAU in various tax scenarios

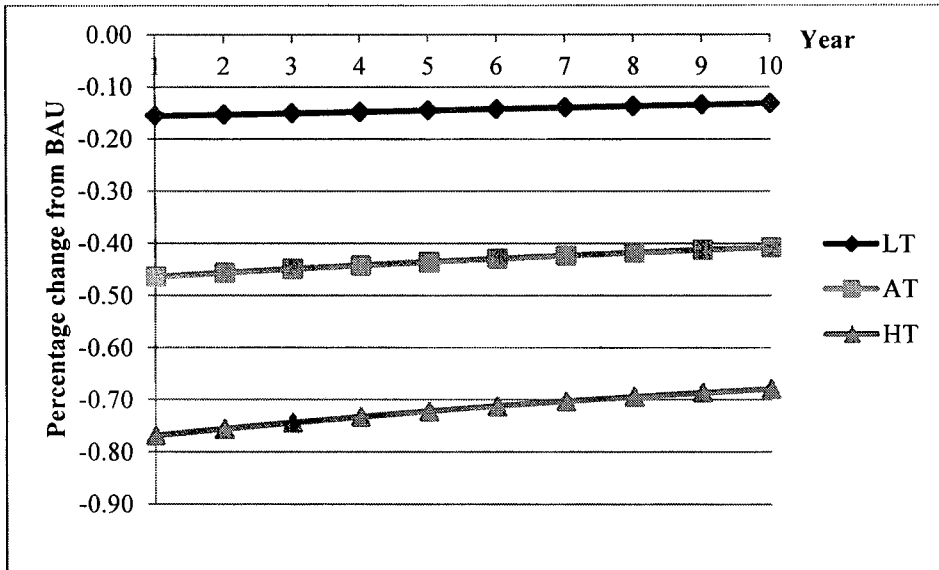


Figure 4.3 Consumption budget of households in percentage changes from BAU in various scenarios

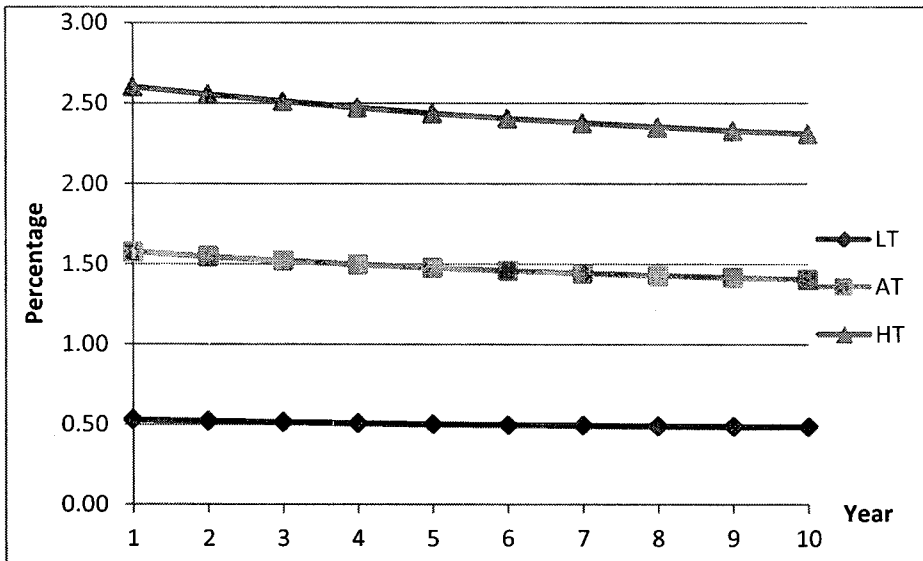


Figure 4.4 Total Government's income in percentage change from BAU in various scenarios

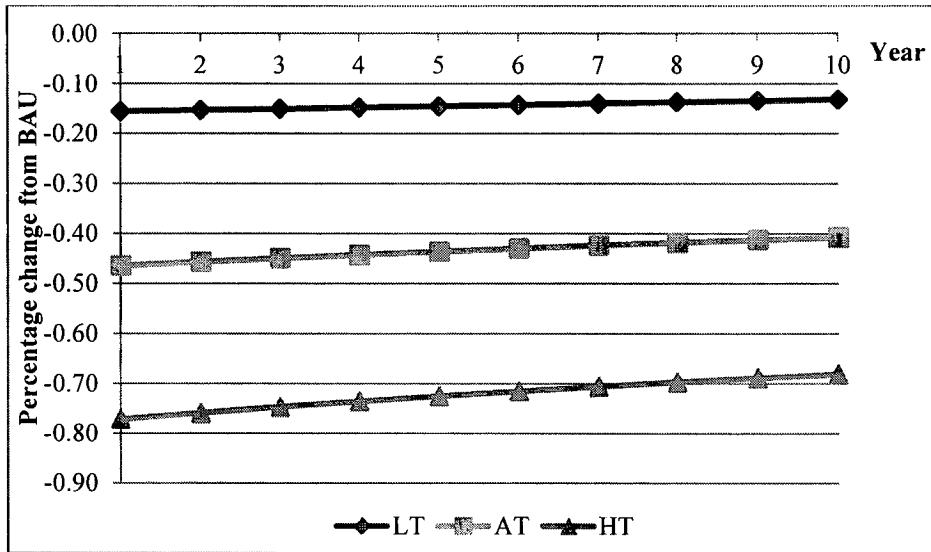


Figure 4.5 Household savings in percentage changes from BAU

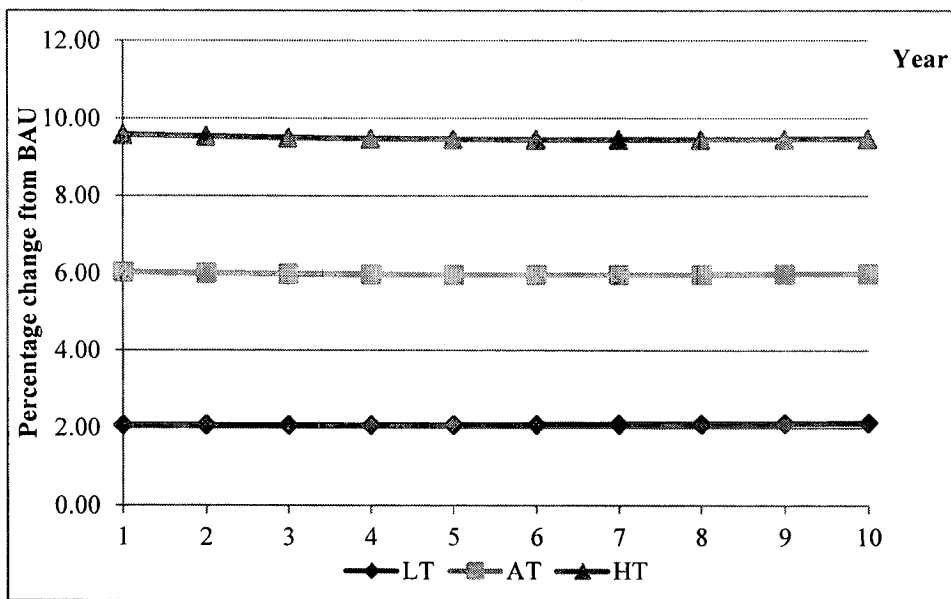


Figure 4.6 Government savings in percentage change in each scenario

In the long term, percentage changes from BAU in all scenarios have slightly dropped compared to the previous period since production activity declines as shown in Figure 4.4. Likewise, increasing in taxes implement cost, the total government income rise up in proportional with CO₂ price is set up.

Household savings is impacted by levying taxes on electricity consumption as the same level as household disposable income, since its equation is described as a linear function as mentioned in Chapter 3. As shown in Figure 4.5, when LT is implemented,

household saving have slightly decline trend approximately about 1.5% from BAU. Household saving declines significantly about 0.5% to 0.4%, which is in AT scenario. The last, household saving decreases for 0.8 to 0.7% from BAU in the HT scenario.

On the other hand, government savings have shown a dramatic upward trend since government expenditure is an exogenous variable in this model, as mentioned in Chapter 3. The government saving is depicted as Figure 4.6. According to model's result, the effect of tax on power generation is constant over period of study. The government saving is increased from BAU approximately 2% in LT scenario. For AT, it has a positive impact about 6%. The high tax scenario (HT) is obtained more saving about 9.5% for this tax policy.

4.2 Employment Rate

According to the shrinkage of GDP due to the influence of carbon taxes, the employment rate declines only a little. As can be seen from Figure 4.7, high carbon tax scenario induces an increase in unemployment about 1.028 people in base year. The more expensive carbon price becomes, the more the employment rate decreases. Likewise, the negative magnitude of decreasing rate in employment will be smaller compared with previous year.

4.3 Electricity Price and Consumption

The electricity price is directly influenced by carbon tax on electricity generation, as shown in Figure 4.8. The electricity price will be influenced by carbon tax on electricity generation. As a result, electricity price in all scenarios would increase. In the lowest price of carbon, the electricity price changes from BAU around 2.1 – 1.98% by diminishing rate in the future. For average price of carbon, the percentage change from BAU is higher than the lowest price of carbon account for 6.5 – 5.9%. The electricity price rose around 10% with the HT scenario.

The increase in electricity prices has a significant impact on electricity consumption by all agents. Figure 4.7 shows the impacts in each scenario from Base line. As result, every one hundred baht charge in carbon per ton for electricity generation would impact on total

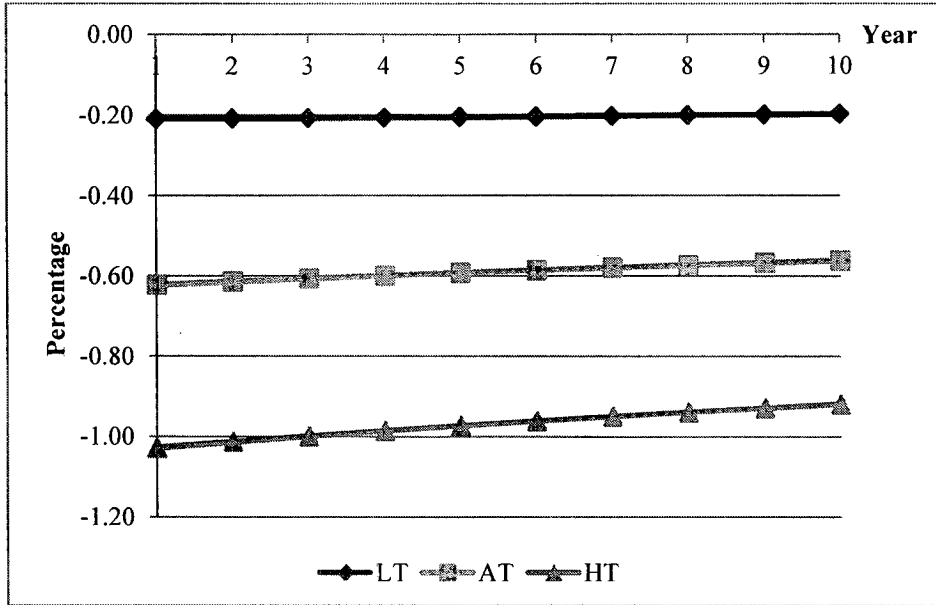


Figure 4.7 Labor demand changes from BAU in percentage.

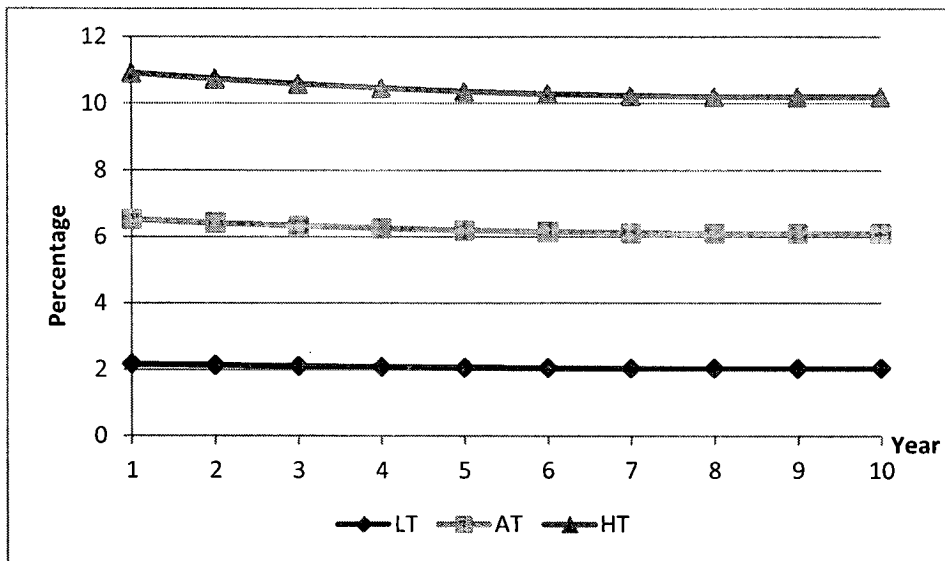


Figure 4.8 Electricity price changes from BAU in percentage change.

electricity consumption about 0.44 % and the impact would reduce going forward. As noticed, in long term, the consumption of electricity has a declining trend in high tax scenarios as compared to low tax since the higher the price of electricity became, the activity output of producer in this model declined.

4.4 CO₂ Emissions

As a consequence of total electricity consumption decline, the negative percentage of CO₂ emissions in Figure 4.10 shows carbon reduction from BAU. This percentage change rate have an increasing rate of each year in all scenario, which reflect the whole activity of

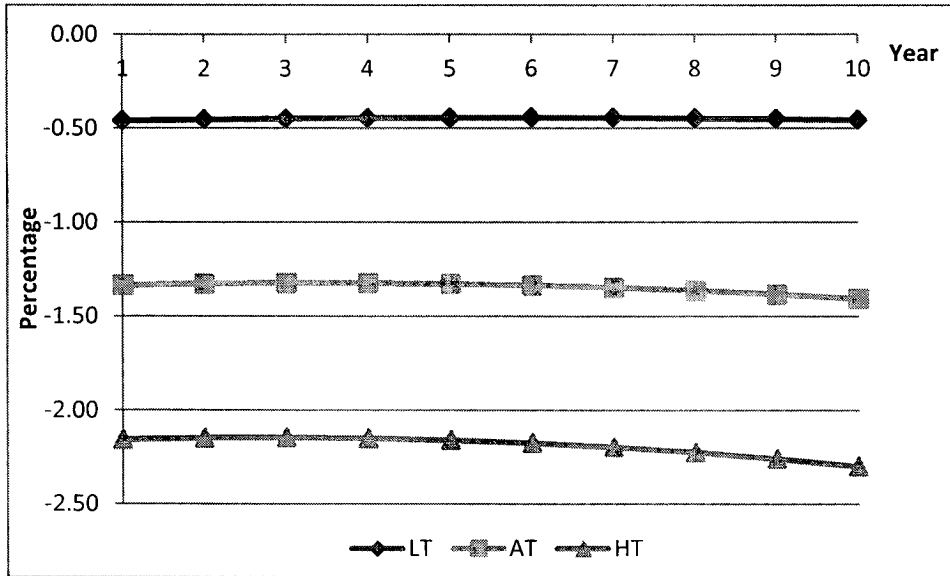


Figure 4.9 Electricity consumption change in percentage change from BAU.

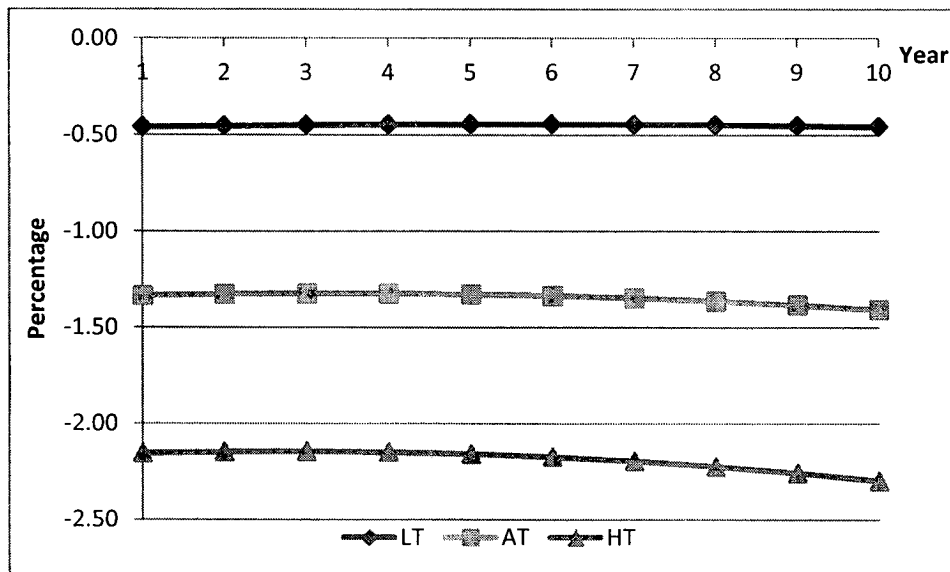


Figure 4.10 CO₂ emission change in percentage change of BAU

production output has lower activity when carbon tax charge on electricity sector. Actually, the carbon emission change in the same percent change of electricity output.

4.5 Total Production Output

Total production output from each sector is the same as the trends of the other parameters, which is the strongest affected during the first period of enforcing the policy, and then weaker for the next period. Figure 4.11 is shown change in total production output all over the study period. It is shown constant decreasing in negative impact of policy when time passes. For LT scenario, the shrinkage of production output is not much so it recovers in

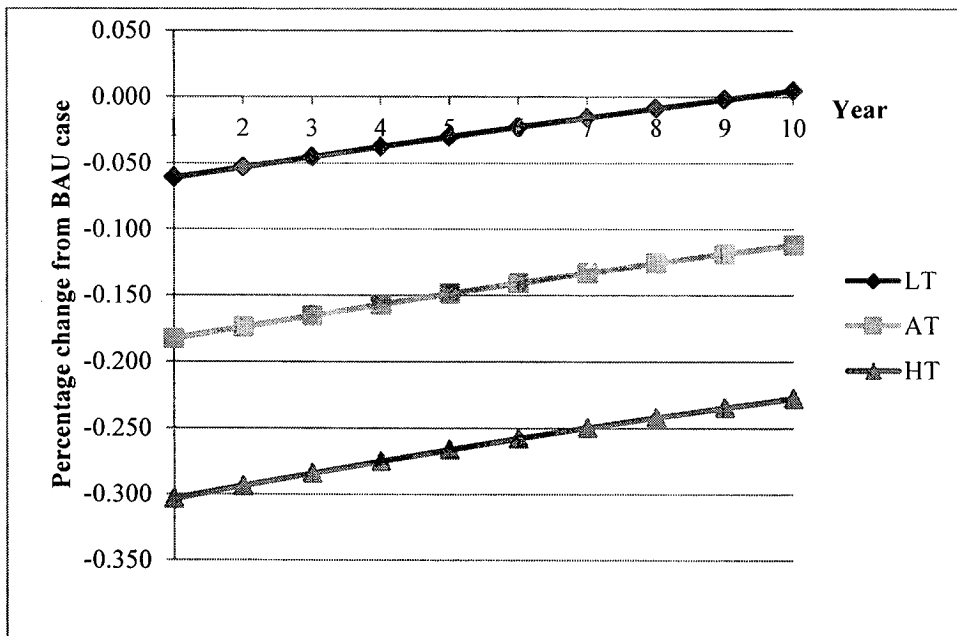


Figure 4.11 Total production output in percentage change from BAU

year 9 of analysis and become expand in year 10 but it is not significant. While AT and HT scenario, the dwindling is greater than rate of economic recovery in 10 years then it has shown decline of production output throughout the period of the study.

4.6 Sectoral impacts

The impact of carbon tax lies on electricity in all sectors of activity can be described in the short-term and the long-term. In the short-term, most of all sectors have

negative impacts in first year that implement the policy. There are two sectors having advantage impact during study period, construction and water transportation.. Since, the construction is major investment of thailand based on SAM 2010. Higher activity level of the latter sector compare with BAU come from increasing in import activity and this sector is mainly consumers as transprotation which is not consume electricity.

In the long-term analysis, in the textile industry, it has seriously negative impacts in all study periods since this sector is an energy-intensive sector, which is considered energy using in bleach and dyeing processes. Furthermore, textile commodities is mainly consumed by domestic market. When consumption budget of household consequently drop during this policy, it is inevitable that its demand declines consistently. Likewise, Iron activity output deduct by 0.12% in frist period of policy implement and 0.07% in last period of study in LT scenario. In AT and HT, its activity output has more drastic downtrend, as shown in Figure 4.9. Similar to textile but this commodities output is mainly consumes as intermediate material for internal activity, because of downtrend in total activity output, the demand fall significantly.

Finally, there are sectors that have obviously an positive impact in the long-term, motor, machine and metal sectors. Those three sectors are top five of exported product values of Thailand. So, export parameters for the dynamic model, which assumes about 5% growth rate including investment parameters, consumption and productivity improvements. These sectors adjust and overcome the increasing price of electricity in the long-term.

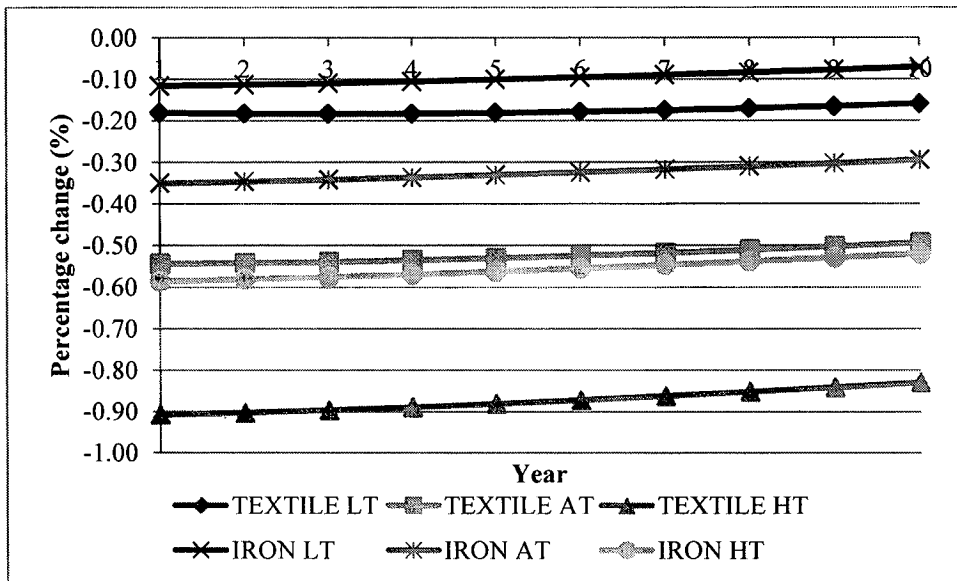


Figure 4.12 Activity output change in percentage change from BAU (Textile and iron sectors)

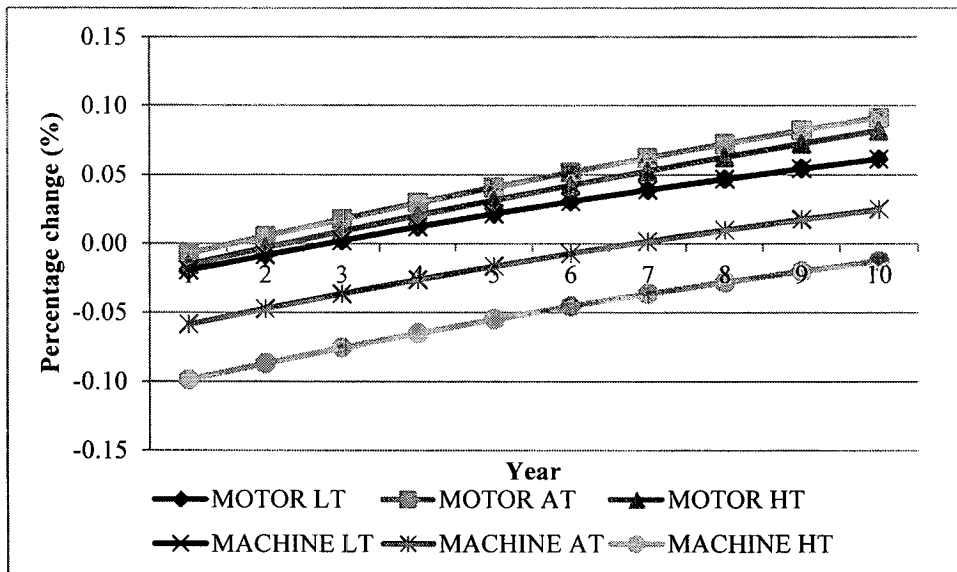


Figure 4.13 Activity output change in percentage change from BAU (Motor and machine sector)

4.7 Flow Diagram

When levying taxes in the power generation sector, electricity prices dramatically increase. As electricity is an intermediate good for almost manufacturing production, it makes total production output decline and less activity than demand for value added fall. Consequently, the price of the product slightly increases then the product is less competitive in the export market which market price is an exogenous parameter. Decline in exports and less domestic good production make more slight imports in each product that uses electricity as one of intermediate goods.

Households receive less income since demand for the value-added slightly declines. When total household income decreases, household saving has a downward trend in the same level because of a linear relation. Likewise, household consumption is diminished as well so that households have fewer budgets to buy goods and services which have increased prices. It could reflect less satisfaction for households. On the other hand, government income increases since it collects more taxes in the power generation sector. Government expenditure in each scenario is fixed but there is a growth rate for each year as consumption, then the additional income transfers into more government saving. Amount of investment money has an increasing trend.

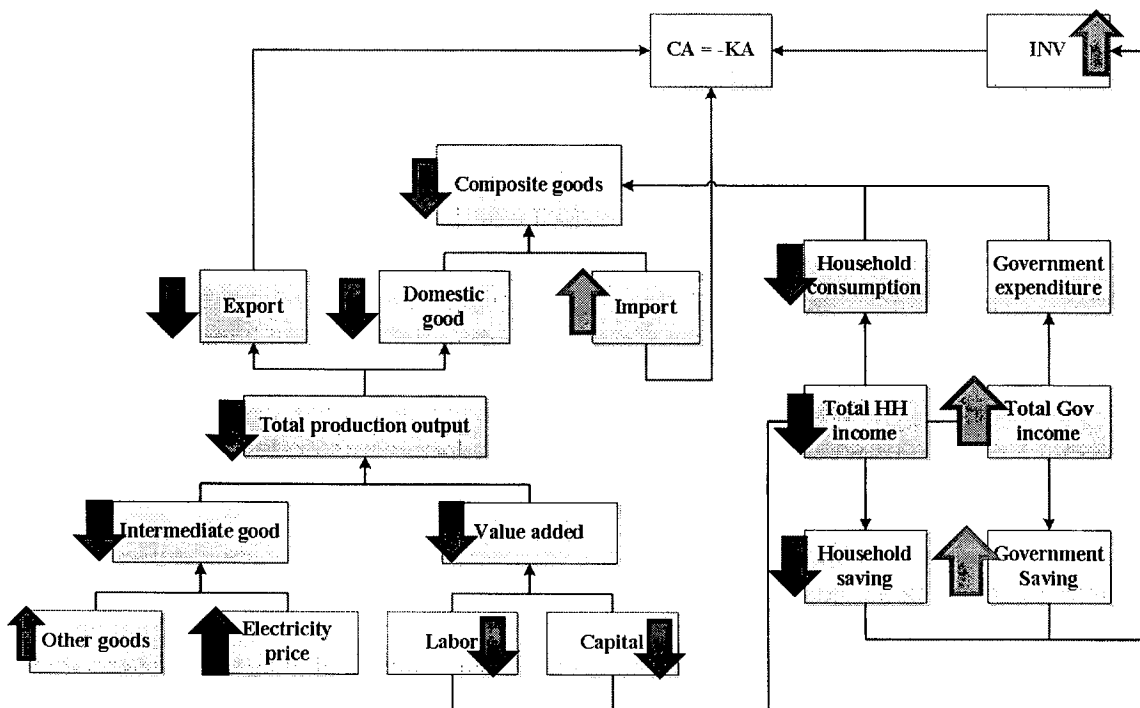


Figure 4.13 Flow diagram when implement tax policy on electric generation