

TAX REFORMS AS A FACTOR OF ENHANCING THE PUBLIC ADMINISTRATION QUALITY (THE CASE OF THAILAND)

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This paper details an understanding of some various business cycle impulses of macro working mechanisms (and their on-going progress), attempting to link the varying public and private sectors to differing economic outcomes of DSGE model (Dynamic Stochastic General Equilibrium model) that captures key aspects of macroeconomic policy and transmission mechanism between policy actions of tax revenue (% of GDP) and economic fluctuations. The model emphasizes the ability of different tax revenue reforming structures for improving public administration quality especially the public finance policy and to overcome distributional and efficiency problems inherent in business cycles.

Keywords: DSGE model, MSBVAR-DSGE model, RBC-DSGE model, economic cycle problems

Terms:

DSGE model (Dynamic Stochastic General Equilibrium model) defined by additional definitions as follows: firstly, the product as the homogeneous goods and secondly, the production used is the same technology for production of their products. In addition, the production function of this model is the Cobb-Douglas production function as presented by equation (16).

Public finance is the study of the role of the government in the economy [1] It is the branch of economics which assesses the government revenue and government expenditure of the public authorities and the adjustment of one or the other to achieve desirable effects and



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avoid undesirable ones. 2] The purview of public finance is considered to be threefold: governmental effects on (1) efficient allocation of resources, (2) distribution of income, and (3) macroeconomic stabilization.

Introduction

Tax revenue mechanism developed to help public and private sectors to estimate the impact of various business cycle impulses. In case of practices in public finance the use of RBC-DSGE model was applied reasonable tax revenue (% of GDP) as an ideal tax revenue reform more or less than weighted average form summation tax revenue (% of GDP) collected up to that time of taxation to enhance public administration quality during period of economic cycles in transition. Several crucial of the DSGE Models are created on the basis of assumptions to ensure with tangible economic preferences and constantly modification in ups and downs pertaining to business cycle.

The basis of assumptions including complicated characteristics where the DSGE models were integrated for open structural market economy during an ideal business cycle. In this situation preferably demands for the expansion period to be collected total tax revenue more systematically than the contraction period. Its primary function is to arrange the implications of the assumptions for right to use to identity and authentication critical simulations. From the steady state, quantitative model disturbs the related characteristics by introducing transition paths toward the post-shock steady state source.

A common unveiling the statistical MSBVAR-DSGE framework behind the DSGE model can provide with well-defined key macro-economic distribution relationships. Dynamic stochastic general equilibrium (DSGE) is explicitly based on optimization in rational manner unsolved variations in the endogenous variables. Random shocks models combine economic behavioral foundations with a full-system estimation approach using key macro-economic variables (Key macro-economic estimation with the possibility implicitly constructed on adequate data, structural breaks, horizontal regions, incoherence, or multiple local maxima.

Modification selects parameters based on empirical findings that result in model that best characterizes Thai economy:

Domestic demand
Consumption (C)
Investment (I)
Government spending (G)

External demand
Exports (X);
OUTPUTS: Domestic good (YD), Export good (YX)
INPUTS: Capital (KD, KX); Labor (LD, LX)
Import (MD, MX)

Calculate the point estimate of the empirical population moment-say, autocorrelation-by fitting a VAR Resample x_t using a bootstrap procedure g iven; estimate a VAR Important

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model features assess statistical moments implied by the model and compare them with those obtained from the data. Certain moments are better matched with data than others) illustrates the characteristics using key macro-economic of complex simulator systems matching observed features of the economy concerning long-term structures, productivity progression, GDP component and factor income shares, short-term structures of inflexibilities in wage and prices.

Thailand's tax system stimulates idealized influence of the economic recovery by stabilizing enormous expected economic movements of working an ideal open structural market economy. Therefore, the chapter helps to explain their old-fashioned strong support for answering facts in positive economic question about alternative combinations of macroeconomic strength and mechanisms improved stronger work ethic, efficiency, stability, and productivity that have become the key success to technological progress in productivity and the economic wealth.

Objective of the study

The main objective aims to provide encompassing insight taxation rate (the values for General government revenue (% of GDP) into the origin of the transition from expansion to contraction events under business cycles.

The specific objectives aim to test the most widely used MSBVAR-DSGE model (Markov Switching Bayesian Vector Autoregressive model-Dynamic Stochastic General Equilibrium model) available. The model encompasses the transition from expansion to contraction events pertaining to business cycle in a relatively simple methodology and to analyze the RBC-DSGE model is designed to assist in the application of unveiling the statistical MSBVAR-DSGE model behind the RBC-DSGE model by leading the researcher through a series of questions in a macroeconomic interactive program.

An understanding of the origin of business cycles is crucial to developing the roadmap solutions reconstructing for tax revenue that would rough draft the background for future direction of tax revenue reform (ideal tax revenue reform policy should cover the tax revenue is the weighted sum of the revenues of weighted different kind of taxes for example, three main types of taxation revenue such as corporate income tax, value added tax (or specific business tax), and personal income tax. Reform policy should cover weighted major taxes administered by the central government and the local taxes administered by the local government).

Restructuring finance policy designs for the best practice to improve public administration quality by adopting RBC-DSGE system of tax revenue reform. For the future of tax revenue reform the transition from expansion to contraction events of economic cycles should recognize the individual key macro determinants, important insights on tax issues, and draws important conclusions. This insight can be traced from the aggregate level improving public administration quality especially the public finance policy to overcome distributional and efficiency problems inherent in an ideal open structural market economy.

Scope of the study

On the transition from expansion to contraction events the use of RBC-DSGE model was applied in order to control the relationship between the values for government tax

revenue (% of GDP) as an ideal tax revenue reform rate and historic output growth (Real GDP (%)) collected up to that time of taxation.

The process uses data collection in a principally qualitative study from 1972 to 2015. Prior proposed tax revenue (% of GDP) would be set to create the initial parameters to estimate by the MSBVAR-DSGE model. In terms of public administration quality the tax collection income is gained by government through taxation on scenarios. Form unveiling the statistical model a proposed tax revenue (% of GDP) was utilized to enhance public administration quality. Government should collect reasonable revenue rate (% of GDP).

Full commitment of respective public administrations towards the policies, an ideal tax revenue reform more or less than weighted average from summation revenue rate (% of GDP) was collected up to that time of taxation. Aimed at first scenario, revenue rate (% of GDP) of collection revenue denotes as whenever economy stand on economic boom. At that moment government should increase proposed tax revenue (% of GDP) greater than weighted average from summation revenue rate (% of GDP) up to that time of taxation. In place of second scenario proposed tax revenue (% of GDP) of revenue collection represents as whenever economy stand on economic recession.

At that moment government should reduce tax revenue (% of GDP) less than weighted average from summation revenue rate (% of GDP) that reduced tax receipts during the critical fiscal years taxation. When public administration stepped in to support on behalf of the best practice of Thai public finance policy as to improve public administration quality, new adopted system of tax reform should recognize the individual key macro determinant during period of economic cycles.

Literatures

However, a small number of scholars organized research on Thai economy by using DSGE model. Surach Tanboon et. al. (2008) used the model to investigate Thai economy in terms of economic fluctuations affected by shocks from course of action. For DSGE model of Thai economy the research works were done by Pongsaparn & Runchanam (2008), Chuantantikamon & Wonlope (2008) and Limjaroenrat & Vorada (2013). Nevertheless, researchers mentioned up to that time did not take account of the application of the of MS-DSGE (Markov Switching Dynamic Stochastic General Equilibrium) model by leading through a series of a questions in a macroeconomic interactive program. Therefore, this chapter focuses on prediction and explanation of the Thai economy phenomena during period of economic boom and economic recession respectively.

The conceptual framework of the study

The conceptual framework described two components of an adopted RBC-DSGE model and MSBVAR-DSGE model for solving a simple formula for the optimal tax revenue to improving public administration quality especially the public finance policy.

Fig. 1 depicts the conceptual framework of the study. The modern tax revenue reform framework was explained by MSBVAR-DSGE model based on the notion, which desired to control the economy for to make the over-all economy function smoothly applied. The primary instrument relates to smooth volatility on the business cycle in much the same way for economic growth. A higher reasonable revenue rate (% of GDP) as an ideals tax revenue

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reform impacts on the various growth rates in much the same way as before. Whenever the economy stay in status of economic boom then the government should use both the public administration and the public finance especially taxation rate in reasonable way, sufficiently well. The implication of this reasonable manner describes that the public finance policy should collect a higher reasonable revenue rate (% of GDP) as an ideal tax revenue reform rate more than weighted average from summation revenue rate (% of GDP) collected up to that time of taxation in previously applied to improve the quality of public finance policy. In contrast, at whatever time the economy acted in a reasonable manner incurring the economic recession, the government supervision should apply both the public administration and the public finance standpoints in opposite way during period of economic cycles.

Government direction should apply a lower reasonable revenue rate (% of GDP) as an ideal tax revenue reform less than weighted average from summation revenue rate (% of GDP). On behalf of reconsidering way to improve public administration applied taxation collected up to that time of quality. Especially for incurring the economic recession the scope and manner of governmental reforms should conduct to apply a lower revenue rate (% of GDP) less than weighted average from summation revenue rate (% of GDP) collected up to that time of taxation applied to improve the quality of public finance policy.

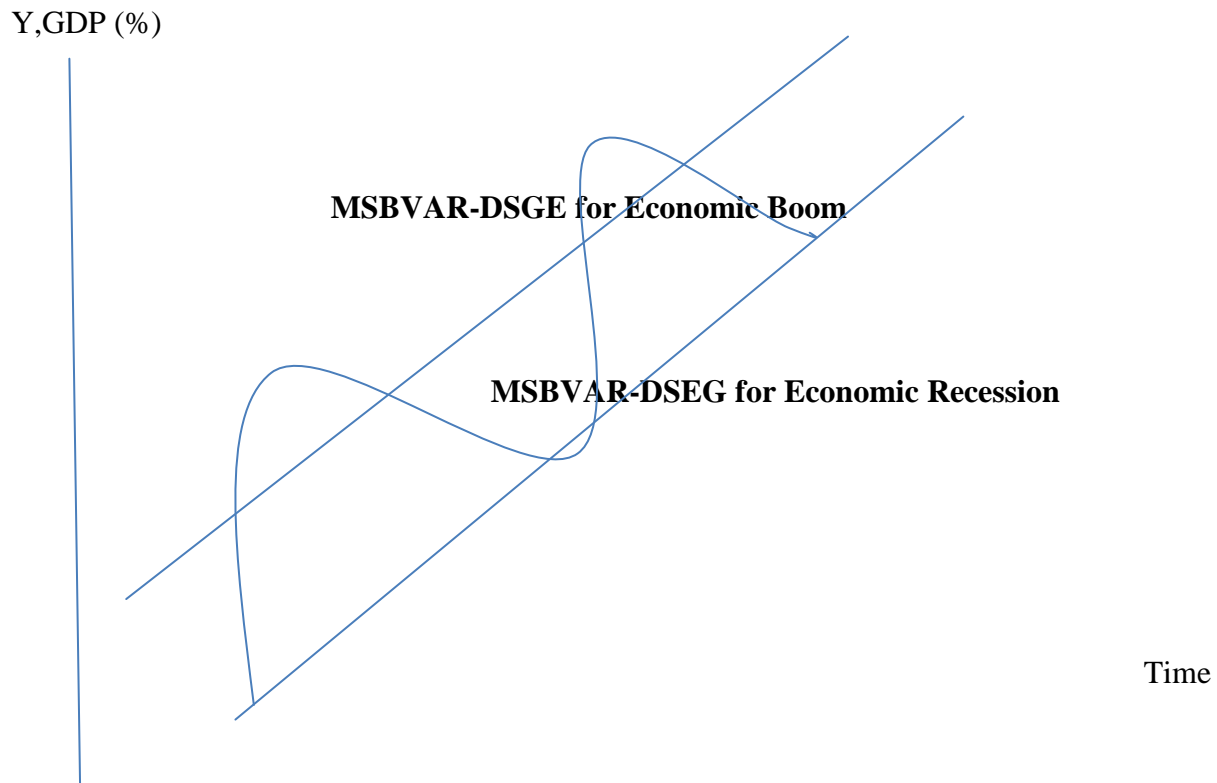


Figure 1 - Conceptual framework of the study
(made by co-authors)

Methodology of the study

Bayesian statistics

The Bayesian statistics was known first by Reverend Thomas Bayes (1702-1761) and the central of this statistics constructed on concept form Bayes' rule (see equation (1)).

$$p(\theta, y) = p(\theta)p(y|\theta) \quad (1)$$

Equation (1) defined that $p(\theta)$ is the prior distribution and $p(y|\theta)$ is data distribution or the random sampling distribution. In addition, $p(\theta, y)$ calls the probability statements about θ given y . Moreover, the joint probability mass function comes up by multiply between the prior distribution and data distribution. The Bayes' rule comes to compute the posterior density of θ given y by equation (2) as presented.

$$p(\theta, y) = \frac{p(\theta, y)}{p(y)} = \frac{p(\theta)p(y|\theta)}{p(y)} \quad (2)$$

where

$$p(y) = \sum_{\theta} p(\theta)p(y|\theta) \quad \text{for the summation of all possible values of } \theta$$

$$p(y) = \int p(\theta)p(y|\theta)d\theta \quad \text{in the case of continuous for all possible valued of } \theta$$

And after the equation (2) should be instated by equation (3.1) and equation (3.2) written both integrated equations as presented:

$$p(\theta, y) = \frac{p(\theta, y)}{p(y)} = \frac{p(\theta)p(y|\theta)}{\sum_{\theta} p(\theta)p(y|\theta)} \quad (3.1)$$

$$p(\theta, y) = \frac{p(\theta, y)}{p(y)} = \frac{p(\theta)p(y|\theta)}{\int p(\theta)p(y|\theta)d\theta} \quad (3.2)$$

For both equations (3.1) and (3.2) are omitted only $p(y)$ or fixed $p(y)$ then the technical core of Bayesian inference presented by equation (4) as follow respectively.

$$p(\theta, y) \propto p(\theta)p(y|\theta) \quad (4)$$

$$p(\theta, y) \propto L(y|\theta)p(\theta) \quad (5)$$

Equation (4) defined a basic form of Bayesian formula used to estimate by Bayesian approach. In addition, $p(\theta, y)$ defined as the Posterior and $L(y|\theta)$ defined as Likelihood

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(Likelihood approach) as well as $p(\theta)$ defined as a prior respectively. Therefore, the final solutions of Bayesian Inference which it would be come up by estimation of equation (5).

Markov Switching Bayesian Vector Autoregressive model (MSBVAR model)

In this research emphasize the MSBVAR model was used to search the regimes of economic cycles and there is valuable whenever the time series are limited to estimate or over problem of over-parameterization. (See more details in Gary and Dimitris, (2010)). The simplest MSBVAR model would be written in equation (6) and equation (7) as presented (see Patrick et al, (2012)).

$$y_t = c(s_t) + \sum_1^p y_{t-1} B_1(s_t) + \varepsilon(s_t), \quad (6)$$

$$\varepsilon(s_t) : N(0, \sum(s_t)), t = 1, 2, \dots, T, \quad (7)$$

where,

s_t = the numbers of state for MSBVAR model

y_{t-1} = the past time series data of y_t

$c(s_t)$ = constants of regime (s_t)

$B_1(s_t)$ = autoregressive coefficient matrices of regime (s_t)

$\varepsilon(s_t)$ = residuals of MSBVAR model in regime (s_t)

$\sum(s_t)$ = error covariance for VAR (p) in regime (s_t), p = numbers of VAR lag length

In terms of Bayesian statistics was employed to quantify the regime of economic cycles by define the prior form in MSBVAR model (see equation (8)).

$$P_r(\Theta, Q, S_T) = P_r(\Theta) P_r(Q) P_r(s_0 | \Theta, Q) \prod_{t=1}^T P_r(s_t | \Theta, Q, S_{t-1}) \quad (8)$$

where

s_0 = Initial state with prior 1/h

s_t = Regime indices

S_{t-1} = the previous state path

Θ, Q, S_T = Prior, Data, Regime indices

The main idea of prior was used which is helpful Zims-Zha prior (Brandt and Freeman, 2006; Sims et al, 2008). The posteriors would be come up to three equations (equation (9), equation (10), and equation (11)) and all equations were shown below here (see more details in Sims et al., 2008).

$$P_r(S_T | Y_T, \Theta, Q) \propto P_r(s_t | S_T), \forall t \quad (9)$$

$$P_r(Q | Y_T, \Theta, S_T) \propto \prod_{i=1}^h p_{ij}^{n_{i,j} + a_{i,j}} \quad (10)$$

$$P_r(\Theta | Y_T, S_T, Q) \propto N(\Theta; \Sigma) \quad (11)$$

In addition, the simulation approach for MSBVAR estimation is a Gibbs with Metropolis Markov chain Monte Carlo to generate sampler of time series data for estimation of S_T , Θ , (see more details in Fruhwirth-Schnatter, 2001, 2006; Sims et al., 2008). Simulation approach to generate sampler of Q still used the same approach (see more details on Fruhwirth-Schnatter (2001, 2006)).

The RBC model (DSGE (Dynamic Stochastic General Equilibrium model))

The simple idea of RBC model describes the structure of economy consisting of four components 1.Household, 2.Firm, 3.Output of Economy (Productivity), and 4.Market respectively. The description of RBC theory was explained practically by DSGE model. The main explanation of DSGE can be constructed the basic model for from five equations as follows.

Household /Firm

$$u(C_t, L_t^{(s)}) = \frac{(C_t^\mu (1 - L_t^{(s)})^{1-\mu})^{1-\eta}}{1-\eta}, \quad (11)$$

where

C_t = Consumption,

$L_t^{(s)}$ = Labor supply,

$(1 - L_t^{(s)})$ =Leisure,

μ = Consumption weight in utility function

η =Relative risk aversion parameter

Equation (11) represents the firms and household's population to economic shock waves and changes, based on their livelihoods especially in Thailand. In addition, Thai households were assumed to be affected by two factors consisting of consumption and leisure. Moreover, households have own their production factors, capital and labor for their firms as well as the Household's capital stock of simplest DSGE model offered mathematic form by as shown on equation (12):

$$K_t^{(s)} = (1 - \delta)K_{t-1}^{(s)} + I_t, \quad (12)$$

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where

$$\begin{aligned} K_t^{(s)} &= \text{Supply of capital stock,} \\ I_t &= \text{Investment} \\ \delta &= \text{Depreciation rate} \end{aligned}$$

In equation (13), it is meaning that the household maximizes expected discounted utility at time 0 and written in terms of recursively given by equation (14). In both presented by two equations below:-

$$U_0 = E_0 \left[\sum_{t=0}^{\infty} \beta^t u(C_t, L_t^s) \right], \quad (13)$$

$$U_t = u(C_t, L_t^s) + \beta E_t[U_{t+1}] \quad (14)$$

In terms of optimization is completed by under subject to the budget constraint as follows (equation (15)):-

$$C_t + I_t + \chi(I_t, K_{t-1}^{(s)})K_{t-1}^{(s)} = W_r L_t^{(s)} + r_t K_{t-1}^{(s)} + \pi_t \quad (15)$$

where

$$\begin{aligned} W_r &= \text{Real wages,} \\ r_t &= \text{Real interest rate or cost of capital} \\ \pi_t &= \text{Profits create by firms,} \\ \beta &= \text{Discount factor } (0 < \beta < 1) \\ \chi(I_t, K_{t-1}^{(s)}) &= \psi \left(\frac{I_t}{K_{t-1}} - \delta \right)^2 = \text{Capital's installation cost,} \\ \delta &= \text{Depreciation rate of physical capital,} \\ \psi &= \text{Installation costs coefficient} \end{aligned}$$

Furthermore, the assumptions of DSGE model defined by additional definitions as follows: Firstly, the product as the homogeneous goods and secondly, the productions used are the same technology for production of their products. In addition, the production function of this model is the Cobb-Douglas production function as presented by equation (16):

Productivity/goods Market clear

$$Y_t = Z_t(K_t^{(d)})^\alpha (L_t^{(d)})^{1-\alpha}, \quad (16)$$

where

$K_t^{(d)}$ = Demand for capital stock at time t

$L_t^{(d)}$ = Demand for labor

α = Share of physical capital in the final good technology, $0 < \alpha < 1$

$\log Z_t = \phi \log Z_{t-1} + \varepsilon_t, \varepsilon_t : i.i.d.N(0, \sigma^2)$, (The total factor productivity, $0 < \phi < 1$)

However, the firm in the structure of this DSGE model would like to maximizes its profits and in terms of mathematics formula can be presented in equation (17) as follows:-

$$Max \rightarrow (\pi_t), \pi_t = Y_t - W_t L_t^{(d)} - r_t K_{t-1}^{(d)} \quad (17)$$

Subject to (Technology constrain)

$$L_t^{(d)} = L_t^{(s)}$$

$$K_t^{(d)} = K_{t-1}^{(s)}$$

$$C_t + I_t = Y_t$$

According to the proposed study public finance policy reconstructs to overcome distributional and efficient problems inherited in an ideal open structural market economy. Reconstructing methodology was beforehand presented to improve public administration quality. The results of this research hopefully improve public administration quality especially Thai public finance policy for government. New adopted system of taxation has an interested to create a new tax revenue collection policy during period of Table (d) shown the descriptive Thai statistics of real GDP and tax revenue during period of 1972-2015.

The research results

This findings help to explain their traditional strong support for research on the assumptions of the standard Real Business Cycles (RBC). The basis of the model encompasses major expansion period or boom and contraction period or bust pertaining to business cycle in a relatively simple methodology. Conservation scenarios are justification that aims at a pre-specified MSBVAR-DSGE model. The application of the MSBVAR-DSGE model identifies tax revenue collected of prior adopted ideal tax revenue reform. The DSGE interactive macro instruments designed to enhance the implications policy model and to assist by leading a researcher through a series of questions in a macroeconomic policy.

Scenario 1 as major expansion period boom case, an adopted ideal tax revenue reform denotes collected tax revenue rate greater than weighted average rate of collected tax revenue on the production function. At that moment government should collect standing on economic boom that are wave patterns produced increasingly volatility of wave patterns. Wave patterns

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intervene expansion period or boom, and contraction period or bust produced increased or decreased by the amount of time pertaining to business cycles.

Scenario 2 worst cases as might provide an adopted ideal tax revenue reform rate denotes collected revenue rate smaller than weighted average revenue of collected tax revenue at the same as that time on the production function. An alternative test to the same function specifies for standing wave patterns produced smaller and smaller for the cycle of fluctuation on economic recession. At that moment government should collect standing on economic bust are wave patterns produced decreasingly volatility of wave patterns. The contraction continues until an adopted ideal tax revenue reform rate stimulate an expansion in investment and the expansion produced increasingly volatility of wave patterns gets underway

Scenario 3 as base case, might provide an adopted regular percentage rate of tax reform denotes collected tax revenue rate covering three main types of taxation revenue such as corporate income tax, value added tax (or specific business tax), and personal income tax (Thailand's Ministry of Finance). According to a summary of the Government's tax policy, the taxation policy three main categories by fixed the revenue of taxation depend on their categories were adopted by using fixed rate of taxation depending on those categories.

Conclusion

The result of this of chapter would be a set up for the conclusion that explains the turning periods by use of the behavior of exogenous variables. RBC-DSGE model is designed to assist in the application of the MSBVAR-DSGE model by leading the researcher to declare the number through a series of answers to be considered in a macroeconomic interactive program. At time period of the production function on macroeconomic policy transmission mechanism, a decision may explain the reversal from expansion to contraction that continues to expand. By reference to the interaction of the collected reasonable revenue rate (% of GDP) as an ideal tax revenue reform rate more or less than weighted average from summation revenue rate (% of GDP) collected up to that time of taxation.

And then this case, if there were at a future revenue rate (% of GDP) as an ideal tax revenue reform rate more or less than weighted average from summation revenue rate (% of GDP) collected up to that time of taxation involved, there would be "business cyclical" movements in the exactly the same up to that time of taxation on the production function. That is, if macroeconomic performances records that the variables in the future "business cyclical" movements will reach the minimum anticipated level. If given revenue rate (% of GDP) as an ideal tax revenue reform rate more or less than weighted average from summation revenue rate (% of GDP) collected up to that time of taxation.

An adopted ideal future taxation rate will replace approximately. And if the macroeconomic performances respond regularly and fully, then the macroeconomic determinants will remain in the desired business cyclical range. But this would be so only if the firms and household's population have a tendency to an ideal tax revenue reform rate knew precisely how much a given rate or an adopted ideal tax revenue reform rate. However, as it turns out so, there is no a lag between the times if a given revenue rate (% of GDP) as ideal tax revenue reform rate is more or less than weighted average from summation revenue rate (% of GDP) added and the models specify numeric representations of time of

taxation. So the variables in the “business cyclical” movements continue to indicate for a desired business cyclical range.

Recommendation

The following part presents tax revenue policy recommendations based on calculation of the RBC-DSGE model is designed to assist in the application of the MSBVAR-DSGE model permits convenient comparison of two or more public administration quality especially the public finance policy from the standpoint of controlling economic fluctuations policy formulation. It is an understanding of the economic fluctuations and consequences, more than anything else, which is critical to wise policy decision-making process. It is an understanding of the significances, more than whatever thing else that is critical to wise public policy decision making important developing solutions to enhance personal working motives.

Profitable firms and household’s population are more effective in getting their policy proposals implemented when all are based on factual economic analysis. Based on foundation forecasting by apprehending structural features of the working mechanisms giving on the inside dependable levels was investigated. Under various qualitative simulations responding policy questions their influences answering qualitatively policy are more persuasive, and policymakers are more likely to listen to a case based on public administration quality facts.

For decisions on the level of future reasonable tax revenue (% of GDP) applied as induces effects on Thai business cycles, macroeconomic policy transmission mechanism between policy actions and policy formulation toward the sustainability should adopt ideal tax reform rate as a regular percentage of tax revenue (% of GDP) on the production function of this model. Form the public finance findings (See more details appendix A, B and C) an ideal tax revenue reform permits convenient comparison of two or more finding the number of results. Public finance actors would be able to improve future public administration quality during period of economic cycles. Especially public finance agents make decisions rationally, the comparison of two or more finding final solutions from the standpoint of controlling economic fluctuations policy formulation.

Public finance performers should compare the number of final finding solutions of the RBC-DSGE model designed to assist in the application of the MSBVAR-DSGE model implemented investigation of tax revenue reform impacting on future public finance policy. Policy reformers need to make sure that the economic fluctuations are not subjected to the economic magnitudes during period of economic cycles.

The stimulus package and a wide-ranging on tax revenue reform policy actions should formulate economic fluctuations toward economic sustainability policy. An ideal opens structural market economy response to stress in existence of the progress, the efficiency, the stability, and the productivity goals. Profitable firms and household’s population have slight or no power on gravitating prices that are consistent with businesses’ faith in Thai stronger work ethic as a key to economic survival. Policy reorganizers need to study the scenarios standing wave patterns instructed on the “correct” interpretation of wave patterns.

Ideal tax revenue reform policy should covering for example, three main types of taxation revenue such as corporate income tax, value added tax (or specific business tax), and personal income tax. The economic fluctuations policy will be restored and public

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authorities' choices will be enabled Thailand's tax revenue reform covering major taxes administered by the central government and the local taxes administered by the local government.

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