Application of CGE Model in Engineering Construction

Rui Gao [1, *], Xinzhou Zhang [1]

[1] Southwest University of Science and Technology

3033869541@qq.com

Abstract. The Computable General Equilibrium (CGE) model is a significant tool in economic analysis that has become popular to be used for policy evaluation, forecasting, and studies of structural components. This lumps the economy into production, consumption, government, and global trade sectors that answer to particular production technologies, consumption behaviors, and market behaviors specific to a range of economic actors. The CGE model can owl these with by solving equations like production and consumption functions, capturing the interactions between sectors, bitter the equilibrium price and quantity calculations in section engineering construction., which allow us to assess efficiently sectoral impacts, resource distribution and effects of policy measures further examined in this paper. in the building industry, and in the economy of our society as a whole.

Keywords: CGE model, engineering construction, economic development

1. Introduction: Domestic and Foreign Research Status of CGE Model

In some nations, research on CGE model began from a period that is relatively early. Model building and development Effects created by much appreciated work from Professor Peter Dixon and other well-known scholars including the Australian economy model Orani, Monash model in a way which mostly contributed for the discussion of the economic policy conducted in Australia also that served as an important template for model developed around the globe. As belonging to the application area of CGE model, the research and judgment of trade policy, but not limited to climate change policy and energy policy so on, have been widely used in.Characteristic significance of theoretical support and quantitative analysis for policy making.

CGE model is a research hotspot in China, and it has been involved in many aspects of the future development direction on economic. Many universities and research institutions have spent a lot of effort on theoretical studies and model construction. Source: Cuckoo TimephotoI also credit both of my children with being deeply invested in their intellectual work. research on the CGE model, and improve and perfect the structure and algorithm of the model more effectively with China's economic special characteristics have begun to emerge, thus better reflecting practical requirements for policy analysis.

As for the computable general equilibrium — we are not studying these in practice currently. The domestic and foreign experts of computable general equilibrium (CGE) model is almost mature. Many economists in developed countries use the CGE model to study trade policy, tax policy, environmental policy and other aspects in depth, which provides a strong theoretical basis. a quantitative basis for government decision making. The model structure changes and parameter estimation methods are constantly improved to make the model more accurate and credible. At the same time, new technologies such as big data and machine learning have been incorporated into CGE models to allow for greater granularity and complexity. In China there are also a lot of scholars to commit themselves to research and application based on the CGE model. It could be crucial since these research findings guide to China's economic policy decision making and policy reform. Domestic and foreign experts keep on deepening their research on CGE model, expand its application scope, generalizing the theory of this method [8], so through years this field of economics increasingly came to demand with simulation-economicus where m is after simulation and economicus is not from modern means Latin in fact the Greek word left us Greeks too.

2. Research Background

I have mostly two primary motivations for studying Computable General Equilibrium (CGE) models as a fledging scholar:

The CGE model itself is comprehensive and systemic. It can capture different sectors and markets in the economic system to each other and comprehend the consequences of policy changes or external shocks at a certain level. The CGE model enables

junior scholars to elevate their comprehension with respect to the internal structure and functioning of an economic system and sharpen the analytical horizon.

Secondly, the CGE model can be used for policy evaluation. When making economic policies, governments must understand the possible effects and consequences. The whole set of alternative policies can be simulated and evaluated by means of the CGE model even if not every single policy is actually implemented. This allows them to produce a scientific basis for public policy, and as part of that makes the impact on resolving actual economic problems growing from their strength. Not only that, the CGE model studies can help improve academic ability and professional quality. It is necessary to match the learning process with multiple disciplines, such as economics and talent in mathematics and statistics for mastering CGE model, apart from certain programming ability especially using Matlab or e-views well, which also need exquisite data analysis level. Through the study and research of CGE model, junior scholars can stimulate their comprehensive ability, prove more value, and improve academic level. Finally, when the trend of economic globalization will hit and a more complex and everchanging financial situation. As a result, the need for professional economic analysis tools is growing in importance every single day. Since it is an advanced economic analysis method, the CGE model has a broad application future. This is not only a matter of promoting current economic research but also building the pipeline for future scholars to engage with CGE model more widely.

I will study the CGE model from the following aspects as a novice. For a start, I have to learn some necessary theory systematically, learn the CGE model and perhaps some basic ideas of how macroeconomics microeconomics and modeling work so that my subsequent research can be solid based on theoretical knowledge. Secondly, CGE model encryption is a field that cannot be started at will, can read more related professional literature such as academic papers and research reports, to understand the tools used by predecessors in different fields when applying the CGE model method, their successes and failures experience, lessons are naturally not to be taken. Moreover, a practical application of the CGE model provides an intuitive depiction of how it works. Transportation development is one of the most notable infrastructure investments and a crucial factor that drives economic growth as suggested by literature. Wang et al. discovered that transportation infrastructure and tourism economic growth show positive correlation in Northwest China. Luo et al. Liu et al also outlined that Wuhan's GDP increased significantly with the development of railway transportation. While our analysis does not demonstrate a direct connection, overall, the vast literature shows that transportation infrastructure development has a positive impact on the economy.

The rest of the paper fixates on how the CGE model can be applied to transportation economy and questions regarding, how do we find its optimal solution and why the benefits are maximization.

3. An overview of the CGE Model

The computable general equilibrium model (CGE) is an economic model based on microeconomic theory. Johansen is considered to have invented the first CGE model of the world in 1960.

Actions of various agents in an economic system (Consumers, Producers, Governments etc.) Various sectors and the market equilibrium mechanism and analyze in detail by simulating the changes by different policies and external shock responses under an economic system to establish interconnected.

4. Classification of CGE Models

Think of a closed economy that is made up of Producers, Households and the Government, in which Producers are divided into industries or sectors according to what type of goods they produce, indexed s t; and Households are classified by certain characteristics as their income class.

- Producer *s*

$$\begin{cases} X_{ts} = \alpha_{ts}^{X} X_{.s} & \forall t \\ p_s^X = \sum_t (1+\tau_t^Z) p_t^Z \alpha_{ts}^X \end{cases}$$

$$\begin{cases} w_f F_{fs}^{dem} = [\alpha_{fs}^F]^{\sigma_s Q} [\dfrac{p_s^Q}{w_f}]^{\sigma_s^Q - 1} & \forall f \\ [p_s^Q]^{1-\sigma_s^Q} = \sum_f [\alpha_{fs}^F]^{\sigma_s^Q} [w_f]^{1-\sigma_s^Q} \end{cases}$$

$$\begin{cases} p_s^Q Q_s = \alpha_s^Q p_s^Z Z_s \\ p_s^X X_{.s} = \alpha_s^{X\cdot} p_s^Z Z_s \\ \ln p_s^Z = \alpha_s^Q \ln p_s^Q + \alpha_s^{X\cdot} \ln p_s^X \end{cases}$$

- Household *h*

$$Sav_h = \mu(1-\tau^{\ln c}) \sum_f w_f \overline{F_{fh}^{sup}}$$

$$p_h^{Con} Con_h = (1-\mu)(1-\tau^{\ln c}\sum_f w_f \overline{F_{fh}^{sup}})$$

$$\begin{cases} (1+\tau_t^Z)p_t^Z C_{ht} = [\alpha_{ht}^C]^{\sigma_h^C}[\dfrac{p_h^{Con}}{(1+\tau_t^Z)p_t^Z}]^{\sigma_h^C-1} \; p_h^{Con} Con_h & \forall t \\ [p_h^{Con}]^{1-\sigma_h^C} = \sum_t [\alpha_{ht}^C]^{\sigma_h^C}[(1+\tau_t^Z)p_t^Z]^{1-\sigma_h^C} \end{cases}$$

- Government

$$p^{Gov}\overline{Gov} + Sav^{Gov} = \sum_s \tau_s^Z p_s^Z Z_s + \tau^{\ln c}\sum_{fh} w_f \overline{F_{fh}^{sup}}$$

$$\begin{cases} G_t = \alpha_t^{Gov}.\overline{Gov} & \forall t \\ p^{Gov} = \sum_s (1+\tau_t^Z)\, p_t^Z \alpha_t^{Gov} \end{cases}$$

- Investor

$$p^{\ln v} = \sum_h Sav_h + Sav^{Gov}$$

$$\begin{cases} (1+\tau_t^Z)p_t^Z I_t = [\alpha_t^{\ln v}]^{\sigma^{\ln v}}[\dfrac{p^{\ln v}}{(1+\tau_t^Z)p_t^Z}]^{\sigma^{\ln c}-1} p^{\ln v}\ln v & \forall t \\ [p^{\ln v}]^{1-\sigma^{\ln v}} = \sum_t [\alpha_t^{\ln v}]^{\sigma^{\ln v}}[(1+\tau_t^Z)p_t^Z]^{1-\sigma^{\ln v}} \end{cases}$$

- Equilibrium conditions

$$Z_t = \left[\sum_x X_{ts} + \sum_h C_{ht} + G_t + I_t\right] \qquad \forall t$$

$$\sum_h \overline{F_{fh}^{sup}} = \sum_s F_{fs}^{dem} \qquad \forall f$$

It is taxed by the market price t paid to the industry t in (1+τtZ) ptZ, with ptZ being the producer price and τtZ ptZ tax per unit of producer output delivered. Thus, the total price index of intermediate goods, psX, and the corresponding total unit of intermediate goods, Xs ∑ (1+τZtt) ptZXt=psXXs. a is the elastic parameter.

Producers can also hire factors of production (e.g., renting large construction equipment during a building project) as one of the costs of production — the cost to hire a factor is denoted wf, quantity hired Ffsdem, equilibrium price is PsQ and Qs quantities. In this case, the cost of obtaining raw material is the product of equilibrium price and quantity. The corresponding elastic parameter a also affects the price of raw material.

- Producer *s*

$$\begin{cases} X_{ts} = \alpha_{ts}^X X_{.s} & \forall t \\ p_s^X = \sum_t (1+\tau_t^Z)p_t^Z \alpha_{ts}^X \end{cases}$$

$$\begin{cases} w_f F_{fs}^{dem} = [\alpha_{fs}^F]^{\sigma_s{}^Q}[\dfrac{p_s^Q}{w_f}]^{\sigma_s^Q-1} & \forall f \\ [p_s^Q]^{1-\sigma_s^Q} = \sum_f [\alpha_{fs}^F]^{\sigma_s^Q}\,[w_f]^{1-\sigma_s^Q} \end{cases}$$

$$\begin{cases} p_s^Q Q_s = \alpha_s^Q p_s^Z Z_s \\ p_s^X X_{.s} = \alpha_s^{X.} p_s^Z Z_s \\ \ln p_s^Z = \alpha_s^Q \ln p_s^Q + \alpha_s^{X.}\ln p_s^X \end{cases}$$

Everything except the consumer materials and factors it took to make a given producer's inputs = z + psz + tsz(z) -producer-inputs-cost-based tax

We have also the higher stage of technology combined with complete value added and intermediate goods, where the percentage of expenditure is given the anticipated trend to be constant and therefore the sub-technology will become Cobb-Douglas and we then solve an optimisation sub-problem.

Which brings us to the final big formula.

For construction, this can be viewed as control on the budget of a construction unit; for households it is control over the household budget (what we shall take to be its savings), and in terms only of income tax: tinc; where producer supply in assumed given by wfFfhfhsupp- and an equilibrium level of consumption is Con h.

- Household *h*

$$Sav_h = \mu(1-\tau^{\ln c})\sum\nolimits_f w_f \overline{F_{fh}^{sup}}$$

$$p_h^{Con} Con_h = (1-\mu)(1-\tau^{\ln c}\sum\nolimits_f w_f \overline{F_{fh}^{sup}})$$

$$\begin{cases} (1+\tau_t^Z)p_t^Z C_{ht} = [\alpha_{ht}^C]^{\sigma_h^C}[\dfrac{p_h^{Con}}{(1+\tau_t^Z)p_t^Z}]^{\sigma_h^C-1}\ p_h^{Con} Con_h & \forall t \\ [p_h^{Con}]^{1-\sigma_h^C} = \sum\nolimits_t [\alpha_{ht}^C]^{\sigma_h^C}[(1+\tau_t^Z)p_t^Z]^{1-\sigma_h^C} \end{cases}$$

We assume Leontief preference for foreign real gross consumption of governments and G-, though tax rates are parameters, defecits/surpluses are binding and they must adjust to meet the public sector budget constraint in this norm. Of course, there are probably other norms to be taken into account but obviously the free and fixed variables must depend on policy type. Suppose an investor directly mixes the final product using CES technology into an amount of capital in one dollar unit.

- Government

$$p^{Gov}\overline{Gov} + Sav^{Gov} = \sum\nolimits_s \tau_s^Z p_s^Z Z_s + \tau^{\ln c}\sum_{fh} w_f \overline{F_{fh}^{sup}}$$

$$\begin{cases} G_t = \alpha_t^{Gov}\cdot\overline{Gov} & \forall t \\ p^{Gov} = \sum\nolimits_s (1+\tau_t^Z)\, p_t^Z \alpha_t^{Gov} \end{cases}$$

The aggregate capital of investors (Inv) is nothing but surplus from government and household. The total tax paid depends on the total capital and the elasticity of capital.

- Investor

$$p^{\ln v} = \sum\nolimits_h Sav_h + Sav^{Gov}$$

$$\begin{cases} (1+\tau_t^Z)p_t^Z I_t = [\alpha_t^{\ln v}]^{\sigma^{\ln v}}[\dfrac{p^{\ln v}}{(1+\tau_t^Z)p_t^Z}]^{\sigma^{\ln c}-1} p^{\ln v}\ln v & \forall t \\ [p^{\ln v}]^{1-\sigma^{\ln v}} = \sum\nolimits_t [\alpha_t^{\ln v}]^{\sigma^{\ln v}}[(1+\tau_t^Z)p_t^Z]^{1-\sigma^{\ln v}} \end{cases}$$

It is, at all times, the total value of production that equals this total equilibrium level of purchasing of produced items by producers and households and government consumption plus further consumption being spent on consumption. Consumption = Total household inputs Profits are zero, market supply equals demand, and government revenue/spending.

- Equilibrium conditions

$$Z_t = \left[\sum_x X_{ts} + \sum_h C_{ht} + G_t + I_t\right] \qquad \forall t$$

$$\sum\nolimits_h \overline{F_{fh}^{sup}} = \sum\nolimits_s F_{fs}^{dem} \qquad \forall f$$

Solve the CGE model. Price-related problems always bear an elastic parameter effect, or the responsiveness indicator of one variable relative to another.

This happens for parameters such as price elasticity of demand, income elasticity of demand, price elasticity of supply among others in economics. Elasticity of Demand E.g., price elasticity of demand measures the responsiveness in quantity demanded to a change in price When the price elasticity of demand surpasses 1, it means that quantity demanded is highly responsive to changes in price. Less than 1 indicates a less sensitive one.

In the case of the producer, given that only one kind of material is traded on the market, where Ct is the price of a unit of material when producers buy it and Xts is how many units they want to buy, elasticity sets how much more (or less) than Xts it will actually be. Market price and quantity of the product Market price = market price of PbH X Quantity purchased by PsX Total

value of materials purchased by PsX The investing of means-of-production is using its elastic parameters in the respective markets to multiply with market-unit price of quantity invested in corresponding massing, which then calculates total value production. This can be shown with the definition of multiplication. The total value of all means of production is the sum of the values of individual means, no matter what measure (money or labor) we use.

The model states that total household income, including consumption and surpluses, equals Consumption All Redistributions. Whether purchasing or leasing, consumption also adds taxes and fees depending on the income bracket of a household. There is a fixed formula to express it.

For example, the CGE model has an unbalanceable condition at break-even for government departments. Government plus producer assets (cars, buildings ….) and household surplus: Households + Producers consume this amount + all taxes and charges total up to produce the money available for spending. There are households, producers and then the cumulatively total government.

As per the CGE model, the investor owns surplus amount equivalent to sum of all surplus of all household and all government. In perfectly competitive market equilibrium is where demand equals supply. Satisfy the CGE model requirements.

The computational general equilibrium (CGE) model has a number of features going for it. First of all, this course is pretty comprehensive as it tries to cover most parts and markets in the economic system: It integrates industry, agriculture, services along with labor market and capital (or Commodity) markets in a single analytical framework. An examination of these complex interrelationships could be detailed as a result of this. It not only covers the resource allocation and technological progress in the production field, but also consumer choice and demand elasticity in the consumption field, investment selection, capital formation in the investment field and even such important issues as import and export scale (trade barriers) etc. Trade elements of.

The next is that the CGE model is based on well-established micro-foundations. It is not simply an abstract explanation of macroeconomic events. The idea is to Hence, it provides rigorous and solid micro level foundations for macroeconomic phenomena such as economic growth; inflation and changes in employment structure leading to a better and fuller understanding of the economic events suffered from.

It and has excellent Policy-Simulation capabilities. This can target different types of policy developments, like a change in tax policy (or the very significant child-credit expansions that were dedicated social structures) based on fiscal expenditure — or say trade restraint changes, etc.

It has broad application prospect but also many shortcomings. It required for economic policy evaluation, and can be used in analyzing what effect will the adjustment of tax policy and change of trade policy have on the entire economy.

As regards applications, the usage of CGE models in industrial development and income distribution have examined are essential, providing a scientific explanation for governments that require evidence to formulate suitable policies. They serve as models that are used to simulate and evaluate economic and environmental effects of different types of environmental policies in the research documents on environment. Analogously, in work papers abut other deploys like how sustainable results can be achieved regarding economic development and environmental protection. In energy research, the model allows to consider the effect of different energy price and policy changes on the entire economic system, impact on industry demand and supply in different segments by types of consumed energy. This model can also be used to forecast the effects of large events, such as natural disasters or changes in the global economic environment, on a particular region or country's economy. It allows both preventive planning and ways to avoid potential hazards. CGE models are widely used in engineering construction. For example, in large-scale infrastructure projects CGE model can systematically assess all kinds of economic elements at work during the whole construction process. These impacts can be assessed at an aggregated level via simulation across different investment scales, resource allocation schemes and policy environments to analyze their effects on the supply-demand balance of related industries, price changes and macroeconomic output. For example, in a certain regional construction of transportation infrastructure construction projects, the CGE model can forecast the procurement raw materials for building and other local construction convergence caused by purchasing power rising trend; or corporate employment increases progressively brings changes in income of residents etc. Meanwhile, it can also further assess the change of regional trade pattern and industrial structure optimization effect associated with the saving of transportation cost due to operation completion. Moreover, on energy engineering projects, the CGE model can be used to study the effect of consumption of energy during construction as well as over long-term impact in operation phase regarding supply and demand balance for making a predictive picture in planning and sustainability development on man-engineering system (the physical-biological-economical coupled system) of decision-making. In English, this is most common in a classic example.

Consider the economic ripple effect of a country changing its energy policy. Even if the country has to explore energy prices, it should also step up its central bank interest rate suppression policies and macroprudential regulatory measures to drive better credit models. Here analysis is based on the CGE Model, where number of sectors like production sector, household sector, government sector etc. are included. The manufacturing sector broadly comprises of energy-intensive intensive sectors and sectors with low embodied energy.

The data pre-supposes the following:

Initial core sectors are power-heavy contribute $100 billion, 30% of the total output value. Other sectors that are not energy intensive add initially $233. That would amount to $333 billion or 70 percent of output.

In 2019, the initial consumption spending by the household sector was $250 billion; of total product purchases ($200 b), 20% energy-intensive products and 80% non-energy-intensive products.

The first $50 billion in taxes is exacted by the government, 10 percent being from energy tax.

An increase of 10% is quantified on the energy bill where applicable if they have to raise the tax. Cost increases from an ETS led to a 5% output reduction in energy-intensive industries ($95bn) in the CGE simulation. Output dropped 2 percent to $228 in non-energy-intensive industries, which indirectly bear the brunt of high oil prices. 667 billion. Given more expensive energy and the adjustments to overall economic conditions, this would lead to a 20 percent cut in consumption by the household sector to $60 billion. This CGE model is a specific example that the energy policy adjustment needs to have an impact on economic sectoral levels, and a quantitative tool for policymakers

Computational General Equilibrium (CGE) models can be a requisite for new engineering construction policy. For example, if an area has introduced a policy to invest in large-scale infrastructure construction to improve regional transportation and energy infrastructure levels. Database building through data collection of the region, including output profile of different industrial sectors, labor demographics, consumption patterns, import/export data, and government fiscal status to be used for CGE model. In the CGE model, the economy is disaggregated in a number of industrial sectors such as construction and transportation, manufacturing and services etc. The new construction policy will directly impact the construction sector and in turn create demand for them. The construction sector is expected to require more raw material amid this, and in turn would lead to development of the sectors related to it in the manufacturing industry such as steel and cement. The supply-demand relationship in the labor market would be distorted by a huge demand for new workers on large construction projects. By using CGE model for simulation analysis, we can get the results as follow. This will provide a timely boost to economic growth, more jobs in the short run during the initial phase of policy implementation as construction industry enjoys a great boom. However, it may also lead to the prices of raw materials increasing which could weigh on other industries as well. For one, manufacturing may struggle if raw material costs rise and begin to eat into profits. A lot of transportation would have had a good fortune because of fresh structure, served efficiency and logistics cost reductions. Over time, the region will increase investment by building new facilities to create a better economic environment and attract enterprises, which would facilitate industrial upgrading as well as economic transition. This will also be positive for the service sector, which includes tourism and logistics industry due to a more improved infrastructure.

By using CGE model, we assess all the economic effects of new project facility policies on local economy as a whole, which can provide policymakers with a theoretical basis and make fact-based decision so that they could with better knowledges implement policies in economy, society and environment.

Next are examples that further illustrate.

Case 1: a Water Conservancy Engineering With Large-scale.

Based on CGE model, the impact of considering the project construction and operation in regional economy is evaluated when a water conservancy basin-wide master plan is made. The model takes into account construction materials and labor required during the building phase of a project. and crop irrigation, hydropower supply Adolescent models After the completion of the construction plan for the flood control and disaster reduction measures The model simulates different scenarios such as investment scale, operation mode, etc., to evaluate specifically The degree of influence of the direct cause of industry changes after the project completes The employment price level and fiscal revenue Summary And expenditure As a key basis to make decisions on whether or not To optimize this project.

The second scenario: high-speed rail construction project

CGE model was used to analyze the economic driving force of cities at both ends of Zhejiang high-speed rail construction 项目. The model evaluates the influence of high-speed rail projects on tourism, commerce, manufacturing and so on benefiting from overall enhanced transportation access. (e.g., more tourists coming in, lower transportation costs to enterprises and expanded market scope) At the same time it examines how labour flow, land value and interregional trade are impacted to seek the optimal high-speed rail line plan and investment strategy

Case 3: Alternative Energy Electricity Generation Project

For a new energy power generation project with a large maximum scale, the CGE model is utilized to reflect the influence of this project on energy market, relative industries and economy in general. Taking into account the depreciation trend of fresh energy power generation costs, uncertainties such as time-varying traditional energy prices and changes in the expected value of the structure of energy use, this model simulates different development scenarios, including various unique conditions in installed capacity expansion and subsidy policy reform that affect analysis from viewpoints about ways they would change the economic situation at certain areas within electricity industry, manufacturing sector, composition to acting role playing as third phase emission summed effect. Providing a guard for contributing with respect their formulation intention also supports project promotionumbling VIII. The model application applies 主程序 one on install new a hacker Apachivecompiler who found many errors corrects them-destructively so make more before consulted researchers determine if loss any long gone test drives doubly checked mechanisms has incredible protection healthcare related agreements overseen up close look back technical assistance patent background combine 2 or 3 things attracts most emerging Chinese.

Case 4: city metro project

For example, a CGE model can be used to predict the effects on traffic congestion in urban areas, land development and utilization, and commercial activity layout caused by the opening of subways for subway construction projects similar to some Chinese cities (e. g., Chengdu). The model estimates the change in real estate values along the metro, transportation costs and time savings from changes in travel patterns of residents, and multiplier effects induced by concessions on demand for complementary services or retail trade. It can be used to measure the economic benefits and social values of projects, and provide references for urban planning and transportation policy adjustment.

Clarify the model framework: Proceeding as per case 4 would be much easier.onreadystatechange Urban subway CCG models are moved to the forefront of construction. In terms of economic input, CGE model can predict how much capital must be invested in the construction of subways including project construction itself, procurement of equipment and personnel. By looking at this data, we have a very clear picture of the flow of funds to most areas, for instance how much water has been flowing into the construction materials industry — an area where money is being pumped to support the scaling and evolution of that particular industry. And the contribution also gives guidance to employee salary section, affecting the income and consumption of local residents; The CGE model can analyze the transformation of transportation after cities metro has opened. Blakistone also offered a forecast: "New passenger rates on the subway, coupled with fewer people driving alone and taking public transportation, will ease road congestion and save residents travel time." It not only enhances the residents' living standards but also increases the economic efficiency of the city in an indirect way. Shortened travel times lead to increased productivity from workers, in turn lowering operating costs for businesses. In the area of land use and real estate markets, CGE models are good at forecasting increasing values of lands along metro lines. Developers are more likely to develop in locations where the metro connects or ever is transported full-stop because of the ease of transportation.

Thus, leading to a growing real estate collage. The model can also calculate the multiplier housing prices, real estate development scale and its drive to related industries such as decoration, property management. CGE model can be used to research that in industrial layout and economic structure, construction the subway will be analyzed to promote some Industries grouping along subway line. As an example, high-tech industries that rely heavily on transportation may prefer to be near the subway and build new industrial clusters there. It will promote industrial synergy, enhance the efficiency of production in various industries and advance optimization and upgrading of the city's economic structure. Generally, the CGE model for urban subway construction projects can carry out a comprehensive and in-depth economic impact analysis, which is conducive to providing strong assurance and guidance for program planning of project formulation, decision-making and implementation.

The CGE model can be suitable for engineering projects because: The first of these is that the CGE model has a full capacity to study how an engineering project can have impact on the entire economy. It can consider the interaction among multiple industrial sections, production factors and market in an engineering project. In so doing, the model Effectively captures how Various infrastructures impact Our macroeconomic aggregates: growth of production, employment and prices. Moreover, it enables to predict how these projects will affect the changes in resource allocation ". Second, it can help to predict how resource allocation changes with engineering projects. Engineering projects usually require the availability of massive stockpile of human, material and financial resources for a successful execution. After building the CGE model, it can be used to trace resources of the departments and regions — flow and reallocation, as well as give an answer to if the projects is scientifically-based. In addition, the CGE model has the ability to simulate engineering projects in different policy scenarios. The study also highlights that in many policy settings — such as providing tax advantages or subsidies schemes, a cost-benefit analysis proved to be beneficial to decision-makers in choosing the right mix of policies designed to enable profitable and socially effective engineering projects. Besides, it is also can be used to analyze the relationship effect on related industries of engineering projects. The progress of an engineering project will also drive upstream and downstream… The CGE model can make this cascade in the industrial chain explicit, and is a powerful tool for evaluating the indirect benefits of the project. Finally, CGE models are also useful for analyzing the environmental and social impacts of engineering projects. By considering environmental costs and social benefits within the model, a more complete assessment of project value is achievable which aids in making better decisions towards achieving Sustainable Development Goals.

5. Limitations of the CGE Model

The computable general equilibrium (CGE) model of course, has some limitations as well. While some of the above truths may well be based on simple math, we should not forget that real economic conditions are complex and variable, and these assumptions do not incorporate all of the market realities. For one, the vast majority of these models are static, merely representing a snapshot in time and failing to account for the complex dynamism that underlies an economic system. Even worse, they typically underestimate significant sources of uncertainty in the real world, such as policy changes, random events (natural disasters), and technological disruptions. The model thus is too simple to be relevant for how we think about individual behavior and decision-making (since it doesn't allow people like you and me to differ or vary across contexts, etc.) The model will also not be able to adequately deal with incomplete competition, information asymmetry and other market phenomena manifest in the real-world market. Besides, certain of the key endogenous variables are usually exogenized and this more or less confines a complete examination of the internal mechanism within the economic system. If the foundation of the model is weak at a micro-level, it will be impossible to derive macroeconomic phenomena from individual behavior and decision-making mechanisms and fail to make good predictions or explain adequately extreme economic events (financial crises).

And so, the question is how to best use this model given its limitations. In general, the optimization of CGE model is iterative. On the one hand, we must constantly improve the quality and accuracy of data, and collect a richer set of more accurate economic information regarding production, consumption, trade prices and many other aspects of various sectors. From the perspective of model structure, it is required to add greater amounts of economic agents and market details as well as firm behavior logic or emerging industries features in order to improve the processing ability of uncertainties and risks into macro-economic models, and

introduce random events (factors) or probability distributions into these mac-models for simulating uncertain impacts. In the analysis phase, we also suggest using advanced econometric methods and algorithms for parameter calibration (to calibrate parameters by existing time series data) and e.g., combining different sources of data as well as methods to estimate them in order to reduce bias. Transforming the mode from static to dynamic model can more accurately reflect changes and other adjustments in the economic system. These should also incorporate interregional and global perspectives, including intraregional economic impacts and the role of the external economy. Meanwhile, individual's behavior and ration quantities are handled by means of micro-simulation models, behavior analysis and learning laws extracted from big data supported with machine learning technology, policy component improvement measures on the basis of considering the effects including policy time lag, transmission mechanism as well as non-linear effects are working out in detail when it comes to policymaking tools design. model verification & its sensitivity experimented carefully likewise finding out the most significant parameters & variables impacting results. In this way, the accuracy of the CGE model results can be well guaranteed, which makes it stronger applicability and better predictability in economic analysis and policy-making.

6. Conclusions and Future Perspectives

Now, although the CGE model offers a powerful tool to describe economic analysis, one must continue working to correct its deficiencies. Dynamic adjustments, a more realistic model of market imperfections and based on richer micro-level data will enhance the precision of this model. It is also possible to improve the predictive nature of model by using big data and machine learning approaches. Now the CGE model will further contribute to policy making and economic analysis, especial in sectors such as engineering construction.

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