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FISCAL POLICY: A MACROECONOMIC TOOL FOR STABILIZING THE ECONOMY

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ABSTRACT

The Government of India to achieve certain objectives frames the Fiscal Polices. It mainly deals with the taxation structure, public expenditure, public debt and surplus and deficit budget. The main objective of fiscal policy is to achieve economic stability and growth. In times of inflation and deflation fiscal policy plays a vital role in stabilizing the economy. Government through its taxation policies and borrowing carries out its public expenditure, which is important for the development of the country. Developing countries like India should be careful in framing fiscal polies as it can also adversely affect the economy that is do more harm than good. This paper seeks to study fiscal policy in detail and understand the objectives and instruments of fiscal policy.

Keywords: Fiscal Policy, Public Expenditure, Taxation, Economic Stability, Growth

INTRODUCTION

The Government of India frames various policies for the smooth functioning of the economy. Monetary and fiscal policies are two such macroeconomic stabilization tools implemented by the government of India. Monetary policy deals with money supply in the economy whereas fiscal policy deals with the taxation and public expenditure of the economy. Fiscal policy can be expansionary or contractionary. Government opts of an expansionary fiscal policy when there is a downfall in the economy, where taxes are reduced and government spending is increased. On the other hand, contractionary fiscal is aimed at reducing the inflation rate of the economy by increase in tax and decrease in government spending. Fiscal policy and monetary policy go hand in hand to achieve higher economic growth of the nation.

According to the fiscal policy, the government decides how much should be the tax rate to earn enough revenue for its developmental and other purposes and what should be the amount spent as public expenditure. If the revenue collected is more than the public expenditure, the government has a surplus account whereas if the expenditure of the government is more than its revenue then it runs a deficit. In case of deficit, government has to borrow domestically or overseas. Alternatively, government can also print new currency to meet its current demand. The primary objectives of fiscal policy in India are (a) to achieve a higher rate of economic growth (b) to attain a stable price level (c) to achieve full employment in the economy. Fiscal policy plays a vital role in increasing the rate of capital formation in both public and private sectors. It helps in mobilizing its resources for financing the government developmental projects. A proper taxation policy stimulates the savings of the people and also provides incentives to the private sector to expand its output. Fiscal policy tries to minimize the income and wealth inequalities existing in the country.

Objective of the Study

This paper seeks to study the relationship between fiscal policy and economic stability. The paper also tries to understand the different instruments used by the government to stabilize the economy and the objectives behind framing the fiscal policies.

LITERATURE REVIEW

According to Ahuja (2007), fiscal policy aims at managing the aggregate demand for goods and services in the economy. Expansionary fiscal policy is implemented to cure recession and to curb inflation, contraction fiscal policy is adopted. He states that fiscal policy is a policy of demand management.

Seth (2008) says that fiscal policy mainly concerns itself with the flow of funds in the economy. Underdeveloped countries use fiscal policy to step up the rate of economic growth. Taxation policy transfers funds from the economy to the public whereas public expenditure flows the money back into the economy. Fiscal policy influences the economy in a very powerful manner.

According to Chaturvedi (2005), Government can influence the level of economic activities through fiscal policies. Government uses its expenditure and revenue programmes to produce desirable outcomes and avoid undesirable outcomes on national income, production and employment.

RESEARCH METHODOLOGY

The data collected on the various aspects of fiscal policy are mostly in the textual form and data is collected from various secondary sources like books, research papers, articles etc.

INSTRUMENTS OF FISCAL POLICY

(1) Taxation

Tax is a compulsory payment, which is paid by the people to the government. In India, the Central government and the State governments levy tax. The tax structure should be such that it raises enough revenue for the government's developmental activities as well as non-developmental activities. The taxation structure in India is divided into two parts, direct and indirect tax. Direct tax is imposed on the income of the individuals and corporate bodies. Indirect tax is levied on sale of goods and services. Tax is an important source of revenue to the government and is also a measure of minimizing the economic disparity, which prevails in the economy. During an upswing in the economy when the inflation rate is high, government imposes a higher tax rate and can even impose new taxes. This is done to reduce the aggregate demand of the economy. Imposing higher tax will reduce the money supply in the economy and will aid in controlling the inflationary gap. During downswing, or deflation, government reduces the tax rate and also cuts down some taxes for the time being. This step would increase the money supply, giving the necessary boost required to increase the aggregate demand of the economy. Tax is government's way of earning revenue, which is then used to meet the budgetary demands. Tax is a necessary tool of the economy because government can fund this money back to the economy in the form of developmental activities. The tax paid by the public to the government goes to funding healthcare services like social healthcare, medical research etc. It is also used to improve and maintain the public education system. In the case of an underdeveloped or developing nation, government cannot rely much on

the income tax for generating revenue, as the per capita income of such countries is less. In fact if high tax rate is imposed on low-income group people, it will adversely affect the people's willingness to work and save. But if tax is imposed on luxury goods, it diverts resources from non-essential consumer goods to the essential goods. Therefore the government should be very careful before imposing taxes, as some taxes can be fruitful but some will adversely affect the economy.

(2) Government Expenditure

Government expenditure is the spending by the government as a part of developmental activities of the country. The aim of the government is to increase infrastructure investment and also spending on research and development. Government expenditure can be classified into three categories:

(a) Current expenditures- it is where government spends on goods and services for immediate use which is to cater to the needs of the public

(b) Capital expenditures- it is the fixed capital formation where the government aims to create future benefits, such as investment in infrastructure, roads, railways, health, proper sewage systems, communication, research spending etc.

(c) Transfer payments- it is the expenditure on social security payments, pensions and unemployment benefits. It does not involve transaction of good and services.

During inflation, government cuts down on its spending on public welfare which results in fall of aggregate demand. On the other hand, during the time of deflation, government increases its spending, which increases the money supply and aggregate demand in the economy. This in turn reduces unemployment and also the deflationary gap. Expenditure on defense, police, and other such activities are considered unproductive, as it does not help in the economic growth of the country, whereas expenditure on the development of infrastructure is a productive expenditure as it assists in the growth and development of industries and other sectors of the economy.

(3) Public Debt

When taxation policy fails to mobilize sufficient resources in the developing countries due to low per capita income, it resorts to public borrowing. Public debt refers to the borrowings of the government, which includes loans from market, borrowing from

within the country or from abroad, from private individuals or from banking and non banking financial institutions. Public debt is an important source of funding of the government to finance its public expenditures and fill up the deficit budget. Public debt wen calculated as a part of GDP (Gross Domestic Product) indicates the ability of the government to meet its future obligations. The six major forms of public debt are (a) Internal and External debt (b) Productive and Unproductive debt (c) Compulsory and Voluntary debt (d) Redeemable and Irredeemable debt (d) Short term, medium term and long term debt (e) Funded and Unfunded debt. Public borrowing can be successful when debts from the idle balances from the people are collected. If borrowing results in fall in the current consumption level or is financed through decreasing investment, it may not give the desired results.

(4) Budgetary Surplus and Deficit

A government is said to have a surplus budget when the revenue earned by the government is more than its expenditure. This excess amount is utilized by the government to repay its outstanding loans or keeps it as reserves for future contingency purposes. This surplus is also utilized for developmental purposes. Budget deficit on the other hand is when the expenditure is more than the income. During this situation, government decreases its public expenditure and opts for a higher taxation scheme. It is a signal that government is not working efficiently and it should take measures to minimize its deficit.

OBJECTIVES OF FISCAL POLICY IN DEVELOPING COUNTRIES

 Mobilization of Resources: Savings are an integral part of resources. Government resorts to voluntary and compulsory savings in order to increase the level of savings, which can be converted into investment. For financing developmental activities through public debt and taxation, resources are required to be mobilized. But the issue with developing countries is that due to low per capita income, the savings is also low.

3. Edoardo Chiarotti and Nathalie Monnet in "Hit them in the Wallet! An Analysis of the Indian Demonetization as a Counter-Insurgency Policy."conclude that demonetization has had an unexpected and welcome the effect in the form of significant and positive impact on surrenders of Maoist extremists. However, the increase in the number of surrenders in the districts where cash is still procurable from mineral trade and public works contractors is not comparable with the higher increase in districts that rely on subsistence agriculture. Thus the demonetization as a policy to curb illicit cash flows to insurgents has had the desired impact on insurgents' violent activities.

To sum up, it is clear that the immediate negative impact of demonetization wore away soon though the size of the operation was tremendous and all the objectives of the operation were achieved to varying degrees. However, the negative impacts such as on GDP cannot be clearly attributed to demonetization alone as there were several factors at play at the same time. The long-term positive impacts are now being felt in the form of better tax compliance, increased use of digital money transactions, control on inflation, and lower terrorist activities. This was confirmed in August 2018 by Economic Affairs Secretary Subhash Chandra Garg of Indian government by stating that "demonetization achieved objectives quite substantially.(Press Trust of India).

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O Nilima Shingate*

AN INTERNATIONAL BILINGUAL PEER REVIEWED REFEREED RESEARCH JOURNAL DECISION PROBLEM OF FINITE AUTOMATA DESIGN

ABSTRACT

Today, it is very difficult to understand the de- signing concepts of deterministic machine. One question is arise? it is possible to understand the concepts of deterministic machine in a very easy manner. In this paper, we have a DFA and develop an method with suit- able examples that how DFA machine works in a simply manner. For it, a consider that a DFA machine takes the input string {a, b} having at least x number of a or y number of b common proven TWO condition. The objective of this paper to under- stand the concepts of deterministic machine in easy

Ke words: DFA, Transition Table, Transition Table (TT)

NTRODUCTION

FA means Finite Automata. FA has TWO types DFA and NFA. DFA stands for Deterministic Finite Intomata

NFA stands for Non-deterministic Finite Automata, DFA and NFA both has FIVE tuples. Only the afference in transition mapping function i.e. S. For DFA as $QX\Sigma \rightarrow Q$ and for NFA $QX\Sigma \rightarrow 2^{\circ}$

DFAs are a fundamental topic in computer science education. Besides being part of the standardized computer science curriculum, the concept of DFA is rich in structure and potential applications. It is useful in diverse settings such as control theory, text editors, lexical analyzers, and models of software interfaces.

A deterministic Finite automaton (also known as deterministic finite state machines) is the system to accomplish many tasks in Computer Science. To increase the computational power of existing computers, it is based not only to increase the frequency of CPU but also we use other modern technologies. The finite automata implementations are used to consider these types of technologies. For example, multiple CPU core is one of the latest technologies which is used now. We can represent DFA by digraphs which is also called state transition diagram. In this digraph the vertices are denoted by single circles of a transition diagram which represent the states of the DFA and the arcs are labeled with an input symbol correspond to the transitions. We represent accepting states by double circles.

Efficient learning of DFA is a challenging research problem in grammatical inference. It is known that both exact and approximate (in the PAC sense) identifiability of DFA is hard.

Finite automata, regular grammar, and regular expressions are three dissimilar representations for regular languages. Regular grammar and regular expressions generate regular languages, and finite automata is a computation model of speech recognition for regular languages [1]. Finite automata is widely used in areas such as text processing [2], compilation [3], pattern matching [4, 5], network intrusion detection and protection [6, 7], image analysis and spatial dynamics [8, 9]. Finite automata mainly have two alternative implementations: nondeterministic finite automatons (NFAs) and deterministic finite automatons (DFAs). DFAs are used widely because they have predictable and acceptable memory bandwidth requirements. Regular

tant Professor - Department of Computer Science, Head of Department, Christ College, Pune BHLINGUAL INTERNATIONAL RESEARCH JOURNAL 37 a January to March 2020 Receipting Alloc 67

expressions are usually used to describe engineering requirements in practice, and they can be converted into a DFA by a sequence of operations [10, 11]. To save memory space, the minimization of a DFA is indispensable in practical applications. In this paper, we focus on the minimization problem without considering the conversion from regular expressions or regular grammar to DFA.

It has been proven theoretically that a DFA has a unique minimal formalization, but only up to isomorphism [3]. This means that the minimal DFA is unique, and has the least number of states needed to recognize a language represented by regular expressions or regular grammar. The minimization of a DFA is beneficial not only for practical applications, but also mathematical problems in theory. Many algorithms can be used to minimize a DFA, and these can be classified into four categories.

The first category uses a series of refinements of a partition on the state set. A typical method is mentioned in [12], and has time complexity O(n2). Hopcroft's and Moore's algorithms also fall into this category. At present, Hopcroft's algorithm is the most efficient known algorithm and has a worst-case time of O(n log n) [13]. Several authors [14, 15] have proven the tightness of the upper bound of this complexity for different families of automata. Hopcroft's algorithm has recently been extended to handle incomplete DFAs [16, 17], and has now been re-described many times to make it easier to inderstand [18, 19]. Moore's algorithm is much simpler an Hopcroft's algorithm. However, it leads to a uadratic worst-case time complexity [20, 21].

The second type of minimization algorithm uses a uence of merging states. The most famous algorithm his type is Revuz's algorithm, which has a linear time plexity. The disadvantage of Revuz's algorithm is it is constrained to acyclic automata [22]. Almeida Zeitoun extended it to automata whose nontrivial gly connected components are cycles [23, 24].

In the third category, Brzozowski's algorithm es and trims the automaton twice to obtain the al DFA [25]. Recently, studies on automaton zation algorithms have mainly focused on

incremental construction and dynamic by minimization, which is the fourth classification Date proposed an incremental algorithm for minimizing facstate automata that allows the minimization to be fraction with the construction in a single step by adding and strings one by one and minimizing the results automaton on-the-fly [26]. Another increment determinization algorithm for general finite automacalled ISC is presented in [27]. Finally, the dynamic minimization solution proposed by Carrasco and Forcos keeps an automaton minimal when insertions or delenanare performed [28].

The previously proposed approaches have he main drawbacks. On the one hand, previous mentioned cannot be used on complicated automata; they are suitable for acyclic automata, local automata, or special automata. Automata that have distinguished accepted states are generally used in many application such as network intrusion detection and image analyse However, only Hopcroft's algorithm can minimize DFAs. On the other hand, many algorithms are to complicated, slow, and difficult to implement Ale with the increases in size and topological complexity a DFAs in practice, the time consumed by minimizing becomes increasingly important. In this paper, efficient minimization algorithm is presented that can be used on various automata and is efficient in practice. The main contributions of this paper are as follows.

- A minimization algorithm based on backward depth information is proposed. We define backward depth and prove the correctness of a partition based on this information.
- Refinements based on a hash algorithm as introduced to obtain the final minimal DFA. Ta efficiency of this algorithm is explained at proven experimentally.
 The proposed algorithm
 - The proposed algorithm can obtain gram generality and time efficiency. Specifically, icm be efficiently implemented in scenarios where in automata has a more complicated upsky complexity.

The remainder of this paper is organized a follows: firstly, some definitions and propositions related

a the minimal D mine we present from a DFA: To minimal DFA: To

computer sei- ei Automata. A fin strings of symeach input strin the first re-sea finite automato A DFA

concept, but d implementavarious speci model softwa input such as Finite Autom $(Q, \Sigma, \delta, q, F)$ 0

> Where O=a finite. I set of inputs q is the initia 0 F is the set o δ can be rep below Transition Тгал Tran We had 1 represent ALGOR By apply Finite Au having al Algorith

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DFA and proposed algorithm are stated, at puilding backward depth in DFA: building backward depth information, prefinement with hash collision checking. In the algorithm are presented in the statistic the of the algorithm are presented. Finally, we the paper with a discussion on practical time application range, and possible extensions.

ATHOLOGY Automata theory is a branch of theoretical or uncoretical A finite state machine accepts or rejects finite of sym-bols and gives a unique computation for apat string[15]. McCulloch and Pitts were among introduce a concept similar to intrationation in 1943.[5]

A DFA is defined as an abstract mathematical but due to the deterministic nature of a DFA, it is simenta- ble in hardware and software for solving specific problems[15]. For example, a DFA can add software that decides whether or not online usera such as email addresses are valid.

Toire Automata (M) is defined as a set of five tuples Q. E. S. q. F)

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Q=a finite, non-empty set of states $\Sigma=a$ finite, non-empty st of inputs δ is the state-transition function: $\delta:Q X \Sigma \rightarrow Q$ in the initial state

Fis the set of final states, a subset of Q. 5 can be represents using either of three approach given

below

Transition Graph.

Transition Function.

Transition Table. We had used the transition table as the approach to

represent &.

By applying this Algorithm we can design Deterministic Finite Automata that accept strings over input symbol a, b aving atmost x number of a & y number of b Vacathan to draw TG

Deterministic Finite Automata M- (Q. L. ö. q., F) Danish Ather, et al., JNIC, Vol. 1, No. 2, pp. 30-33, 2013 Q= { q...q.,q......q.,q.,q. Y= (a,b) $\delta : QX\Sigma {\rightarrow} Q \ (Represented \ by \ Transition \ Graph \)$ Q0 = qij when i=j and i=j=1.ieq. $F = \{q_0, q_0, q_1, \dots, q_n, q_n, \dots, q_n\}$ Let Q be the set of states in Deterministic Finite Automata such that Q= { q ... q Where i = 1 to x+1j=1 to y+1 Input Symbol $\Sigma = \{a, b\}$ qu is the initial state. Design a directed transition graph having (x+1)*(y+1) states and mark all states as final states. Label each node as queque que que que Where i = 1 to x+1; j= 1 to y+1; x= na & y=nb FOR i= 1 to x do FOR j=1 toy do if i=j=1 then q. EQ0 (Initial State) else there exist a edge E such that $\delta(q, a) \rightarrow q + 1$ done inner loop done outer loop FOR i= 1 to x do FOR j= 1 to y do if i=j=1 then q, & Q0 (Initial State) else there exist a edge E such that S(q,b)-q+1.1 if i=x+1 and j=y+1 then there exist $\delta(q_a, a) \rightarrow q_a$ and $\delta(q_a a) \rightarrow q_a$ done inner loop done outer loop q11 being the initial state DFA "M" will strings over input symbol a, b having atmost x number of a & y number of b if all the input is consumed and halting state is the final state. IMPLEMENTATION

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Example 1: Design a DFA, over a language $\{a,b,c\}$ which start with 'ab' and end with 'bc'. Let the resultant DFA is $M = (Q, \Sigma, \delta, q_0, F)$ Where $Q = \{q_k q_k q_k q_k q_k\}$ $\Sigma = \{a, b, c\}$ $\delta = Q X \Sigma \rightarrow Q$ $q_{i-} \{q_i\}$ $F = \{q_i\}$



Figure 1: DFA.over a language (a,b,c) which start with 'ab' and end with 'bc'

Transition Table :

M	8	b	C
qo	<i>q</i> ₁	Q E	q _E
q ₁	Q _E	q ₂	q _E
q ₂	Q4	q ₂	q ₃
q ₃	q ₄	q2	q ₄
q ₄	q4	q ₂	q ₄
q _E	q _E	q _E	q _E

xample 2:

esign a DFA, over a language $\{p,q,r\}$ which start with q'having sub string 'qpr' and end with 'rq'. t the resultant DFA is $M = (Q, \Sigma, \delta, q_o, F)$ here

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 $Q = \{q_n q_1 q_1 q_2 q_3 q_4 q_4 q_4 q_4 \}$ $\Sigma = \{p, q, r\}$ $\delta = Q X \Sigma \rightarrow Q$ $q_{n-} \{q_n\}$

F = {q,}



Figure 2: DFA over a language {p,q,r} which start with 'pq' having sub string 'qpr' and end with 'rq'.

Tran	sitio	nT	ab	le:

M	a	b	c
q ₀	q ₁	q _E	q _E
q ₁	q _E	q ₂	q _E
q ₂	q ₃	q ₂	q ₆
q ₃	q ₆	q ₂	q ₄
q ₄	q ₇	q 5	q 4
q 5	q ₇	q ₇	Q4
q ₆	q ₆	q ₂	q ₆
q ₇	q ₇	q ₇	Q4
q _E	q _E	q _E	QE

RESULT ANALYSIS AND DISCUSSION In the FIRST example - DFA, over a language [abd which start with 'ab' and end with 'bc'. Input symbol 'b' is an

Input symbol 'b' is common so, smallest accepted street

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DE or CLUE : sumber of states in DFA = total number of condition for symbol + 1(our side)

chinis example it should have 5 states. st when it draw the basic DFA, it contain only 4

b's common. dates

solving it come to know that 1 state is sicellancous.

statra or miscellaneous state will come

ute SCECOND example - DFA, over a language which start with 'pq' having sub string 'qpr' ad end with 'rg'.

nut symbol 'q' and 'r' are common so, smallest accepted ming over {p,q,r} is papra.

According to above RULE or CLUE :

ishould have 8 states.

But when it draw the basic DFA, it has only 6 states, Because 'q' and 'r' are common.

After solving we come to know that 2 state is miscellancous.

weextra or miscellaneous state will come. CONCLUSION

This research will definitely enhance the teaching learning environment of theory of computation and helps engineering students to design DFA.

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