



# CONSTITUTION AND ECONOMIC MODELS FOR THE REPUBLIC OF NEPAL

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## Abstract

Transformation from feudalism to full fledged liberal democracy is proving a very difficult transition despite very successful election for the Constituent Assembly and declaration of the Republic of Nepal on May 28, 2008. New constitution should promote politics of reconciliation based on broader national interest removing the possibilities of conflicts based on narrow party centred non-ideological ethnic and regional interests. Game of cooperation, coexistence and tolerance should be a nature rather than compulsion forced by the lack of a clear majority of any political party in the CA in the Republic of Nepal. Economic plans and programmes based on more scientific modelling for all households, regions and ethnic groups and entrepreneurs in a more decentralised and efficient dynamic market economy only can fulfil aspiration of those eleven million voters. Unflinching commitment of political and economic participants on grow Nepal contract based on more farsighted dynamic equilibrium models or on game theories or in macroeconomic models that can track the past and project the future more accurately should be norms in decision making. Speedy rate of growth with redistribution to alleviate poverty should be the top agenda of new constitution that will truly open Nepal's way for advancement in the 21<sup>st</sup> century more competitively together with her neighbours China and India in coming years.

Keywords: conflict, growth, Nepal

JEL classification: C6, H1, O5

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<sup>1</sup> I appreciate discussions with colleagues in the international conference on growth development and poverty (GDP2007) Conference held during Dec 16-18, 2007 in Kathmandu. However author is responsible for the opinions expressed in the article.

# ON CONSTITUTION AND ECONOMIC MODELS FOR THE REPUBLIC OF NEPAL

## I. INTRODUCTION

Eleven million Nepalese people- from Mountains, Hills and Tarai and from Mechi to Mahakali - voted cleverly for the 601-member Constituent Assembly (CA) on April 10, 2008 (26 yet to be nominated). Nepal was declared a republic by the first meeting of the CA on May 28, 2008 in which 570 members voted emphatically for abolition of 253 old institution of monarchy that had been responsible for economic, political and social backwardness of Nepal away from the global community of the 21<sup>st</sup> century( only 4 voted against). The summary of results presented in Table 1 shows that people have left plenty of room for bargaining and coalition for cooperation among major political parties contesting for power for speedier growth and development of the country. The Communist Party of Nepal (Maoist) with radical ideas was able to get 37 percent of overall votes double than the NC and the Communist Party of Nepal (UML) which had been seen as dominant political parties by observers before this election. Despite that CPN(Maoist) does not have a clear majority to form its own government and has no option than to form a coalition with other partners. No one had predicated the astounding victory of CPN(Maoists) like this or the emergence of separate political parties such as Madhesi People's Rights Forum (MPRF)and Tarai Madhes Loktantrik Party (TMLP) in Tarai region. Pattern of votes clearly show that people want radical changes and they are fed up with old established parties or want to teach them lessons. In the meanwhile people do not completely trust new political forces until they deliver what they have promised.

Table 1  
Members of Constituent Assembly by Political Parties in Nepal:  
Result of Election on April 10, 2008

|                             | Total | Maoists | NC     | UML    | MPRF  | TMLP  | Others |
|-----------------------------|-------|---------|--------|--------|-------|-------|--------|
| Total                       | 601   | 220     | 110    | 103    | 51    | 20    | 70     |
| First Past The Post (FPTP)  | 240   | 120     | 37     | 33     | 29    | 9     | 11     |
| Proportional Representation | 335   | 100     | 73     | 70     | 22    | 11    | 59     |
| Nomination                  | 26    |         |        |        |       |       |        |
| Percentage of each party    | 100%  | 36.61%  | 18.30% | 17.14% | 8.49% | 3.33% | 11.65% |

Data source: Election Commission of Nepal, May 2008.(<http://www.election.gov.np/EN/>)

Thus the political and economic game in Nepal is now at least among five players - Maoists, NC, UML, MPRF+TMLP and coalitions of all other minor parties. No one has clear majority. Playing alone generates zero value and playing together to creates

extra value. Gains for bargaining could be distributed among players more evenly. Each of the political parties must play a cooperative game rather than non-cooperative one for the sake of political stability required for growth, development and alleviation of poverty in Nepal. Nepalese people are clever enough to put them in this situation that no party has a dictatorial position. More analysis on election results are in section II followed by short discussion on the nature of constitution in section III. Then it is argued that decision in Nepal should be taken on more scientific models in order to achieve efficiency, justice and higher rates of growth. For this reason a dynamic general equilibrium model of Nepal is presented in section IV, game theoretic model of poverty in section V and macroeconomic model of Nepal in section VI. Conclusions and references are at the end.

## II. POLITICAL STRUCTURE AFTER THE CA ELECTION

The CPN (Maoist) had done well in the FPTP election by winning 120 out of 240 seats and 29.3 percent of votes in proportional representation (100 seats). Its dominance by districts is given in Table A1 in the Appendix. In general it commands about 37 percent of the votes in the CA. The NC and the UML who were beaten severely in the FPTP election gaining only 37 and 33 seats were however able to earn 21 and 20 percent votes under the proportional representation thus able to win 18 and 17 percent of total votes cast in the election. Parties from Tarai MPRF+TMLP were able to garner about 11 percent of votes.

Table 2

Total Candidates and Winners in the CA Election for Political Parties by Gender in FPTP

|    | Political Party                      | Candidates |      |       | Elected |      |       |
|----|--------------------------------------|------------|------|-------|---------|------|-------|
|    |                                      | Female     | Male | Total | Female  | Male | Total |
| 1  | Communist Party of Nepal (Maoists)   | 43         | 197  | 240   | 24      | 96   | 120   |
| 2  | Nepali Congress                      | 26         | 214  | 240   | 2       | 35   | 37    |
| 3  | Communist Party of Nepal (UML)       | 27         | 212  | 239   | 1       | 32   | 33    |
| 4  | Madhesi People's Rights Forum, Nepal | 3          | 100  | 103   | 2       | 27   | 29    |
| 5  | Tarai Madhes Loktantrik Party        | 4          | 90   | 94    | 1       | 8    | 9     |
| 6  | Sadhvawana Party                     | 4          | 83   | 87    | 0       | 4    | 4     |
| 7  | Janamorcha Nepal                     | 28         | 175  | 203   | 0       | 2    | 2     |
| 8  | Nepal Workers and Peasants Party     | 27         | 71   | 98    | 0       | 2    | 2     |
| 9  | Independent                          | 42         | 774  | 816   | 0       | 2    | 2     |
| 10 | Rastriya Janamorcha                  | 15         | 107  | 122   | 0       | 1    | 1     |
| 11 | Others                               | 150        | 1554 | 1704  | 0       | 0    | 0     |
|    | Total                                | 369        | 3577 | 3946  | 30      | 209  | 239   |

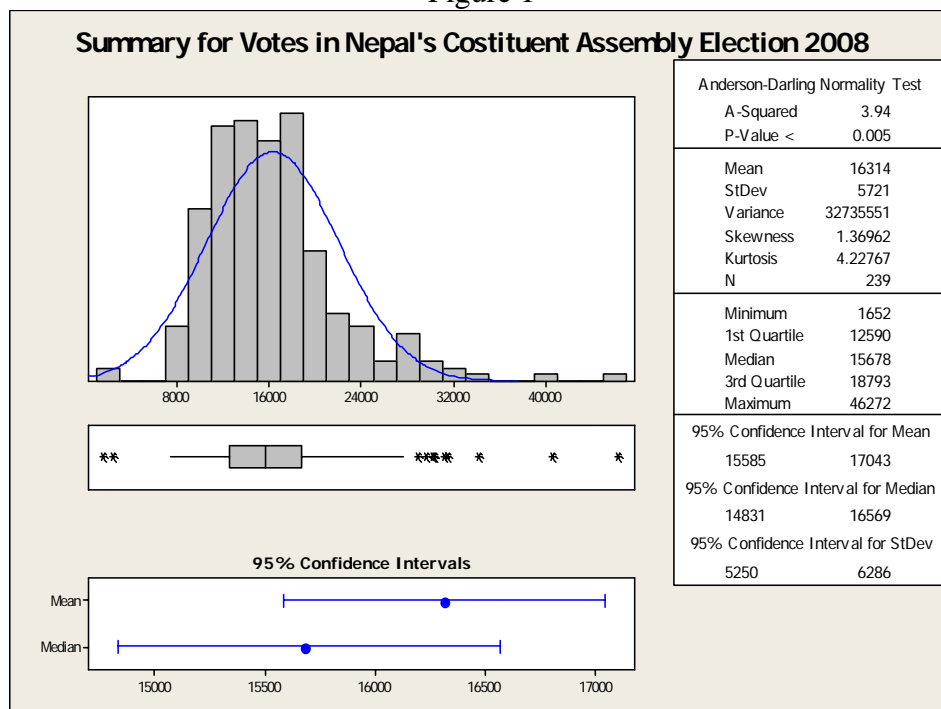
Data source: Election Commission of Nepal, May 2008 (<http://www.election.gov.np/EN/>)

Parties that did very bad in the FPTP election did relatively better in the proportional representation as shown in Tables 2 and 3.

Table 3  
Votes obtained by political parties in the CA Election 2008 and allocation of CA seats for proportional representation

|    | Political Parties                    | Votes    | Percent | PR-Seats |
|----|--------------------------------------|----------|---------|----------|
| 1  | Communist Party of Nepal (Maoists)   | 3144204  | 29.28%  | 100      |
| 2  | Nepali Congress                      | 2269883  | 21.14%  | 73       |
| 3  | Communist Party of Nepal (UML)       | 2183370  | 20.33%  | 70       |
| 4  | Madhesi People's Rights Forum, Nepal | 678327   | 6.32%   | 22       |
| 5  | Tarai Madhes Loktantrik Party        | 338930   | 3.16%   | 11       |
| 6  | Rastriya Prajatantra Party           | 263431   | 2.45%   | 8        |
| 7  | Communist Party of Nepal (M.L.)      | 243545   | 2.27%   | 8        |
| 8  | Sadhvawana Party                     | 167517   | 1.56%   | 5        |
| 9  | Janamorcha Nepal                     | 164381   | 1.53%   | 5        |
| 10 | Communist Party of Nepal (United)    | 154968   | 1.44%   | 5        |
| 11 | Others                               | 1130522  | 10.53%  | 28       |
|    | Total                                | 10739078 | 100.00% | 335      |

Figure 1



As presented in Figure 1 winning candidates obtained from 1652 to 46272 votes with 75 percent of candidates obtaining not more than 18793 votes. Median vote for winning candidate was 15678 and mean was slightly pulled up to 16314 by 25 percent of the candidates who obtained more than 18793 votes. Multivariate ANOVA analysis and F-test and p-value computed using the MINITAB suggest that these votes varied

across regional and party lines while there were not significant differences on the basis of gender of the winning candidates as presented in Table 4.

**Table 4**  
**Regional, Party Specific and Gender Factors in**  
**Variance of Votes Obtained by the Winning Candidate**

Analysis of Variance for Votes, using Adjusted SS for Tests

| Source | DF  | Seq SS     | Adj SS     | Adj MS    | F    | P     |
|--------|-----|------------|------------|-----------|------|-------|
| Gender | 1   | 98023918   | 1915492    | 1915492   | 0.07 | 0.789 |
| Party  | 9   | 1165495700 | 898035964  | 99781774  | 3.73 | 0.000 |
| Region | 2   | 478942482  | 478942482  | 239471241 | 8.95 | 0.000 |
| Error  | 226 | 6048599018 | 6048599018 | 26763712  |      |       |
| Total  | 238 | 7791061117 |            |           |      |       |

S = 5173.37    R-Sq = 22.36%    R-Sq(adj) = 18.24%

The candidates of the CPN(Maoist) had more votes than those of other parties and candidates in the Hill region obtained more votes than those in Tarai or Mountain region. There was also a clear ethnic pattern on votes which is a bit out of scope for the current paper.

### **III. CONSTITUTION FOR THE REPUBLIC OF NEPAL**

New constitution should address the burning challenges Nepal. First, it should give top priority to alleviation of poverty and for creating good environment for speedy economic growth and development. It should build incentive mechanism that promotes honesty, hard-work, entrepreneurship, harmony, tolerance, peaceful coexistence, preservation of unique culture, nature and environment of Nepal as a Himalayan Republic that can compete and thrive in the global economy of 21<sup>st</sup> century and beyond. Division of power among legislative, executive and judicial bodies at the central and provincial level should have check and balance mechanism for full-fledged liberal democracy that promotes participation but eliminates discrimination on any basis and creates a corruption-less society and has enough provision for social justice, reward and punishment according to deeds of its citizen. It should realise that the massive poverty could be eliminated in one generation (30 years) when five year old children now become properly educated and skilled young adults and start meaningful life with decent earnings. The constitution should make a provision of minimum basic needs and development of full potential of every citizen. Financial system should be made

efficient so that firms and households can borrow and lend intertemporally to maximise their life time income though the system of competitive market economy that has enough provision for student loans, mortgages and business needs. It should make public and private sector work in harmony in achieving macroeconomic stability and microeconomic efficiency and social justice.

As this author argued earlier (Bhattarai (2006)), “constitution essentially is a contract between the citizens and the state. It is an arrangement by which people rule themselves by means of elected representatives who make rules and regulations that establish rights and duties in several matters for a smooth functioning of society. The United Kingdom has an unwritten constitution that is built upon the historic documents on rights of people such as the Magna Carta (1215 AD). In recent years written constitution started with American Declaration of Independence in 1776 which basically adopted the principle of no taxation without representation. Then came the French Revolution in 1789 which established a republic based on liberty, equality and fraternity. The socialist constitution goes back to the October Revolution in 1917 in which Russian Bolshevik party tried to form a state of proletariats based on Marxist-Leninists ideology of elimination of bourgeoisie and success of workers party that was followed in China by the Chinese communist party which was later revised by the Mao-Tse Tung. Decolonisation of many Asian, African and Latin American countries in 1940s and 1950s has given further importance to the system of written constitution based on adult suffrage and fundamental human rights and clear statement of the aims and objectives of the political and economic system of a nation (see Hoar Roger Sherman (1917), Chih-Mai Chen (1947), Gooch Robert K. (1947), Wallace D.D. (1951), Houn Franklin W. (1954), Kawai Kazuo (1955), Gangal S.C. (1962), Pakenham Robert A. (1964) Peacock Alan T and Charles E Rowley (1972), Weisskopf Thomas E. (1975) Walder Andrew G. (1987), Tideman Nicolaus (1994), Valensise Marina (1988), Haggard

Stephen and Chung-In Moon (1990), Lutz Donald S. (1994) Hein Laura E. (1994) Acemoglu (2001)). The major aspect of any constitution is its preamble that sets the aims and objectives of a nation, formal procedure of representation in legislature, formation of executive body such as the councils of ministers and arrangement of a supreme court, statement of procedures of how each of these shall work in practice and provision for exceptional circumstances.

A good constitution alone does not automatically provide a true democracy as Haun (1954) rightly states that the Chinese constitution is the most democratic in the world but in practice China has very limited democracy, every representative basically rubber-stamps the decision of the party. The United Kingdom does not have a written constitution but it is one of the most democratic countries in the world. A long constitution does not necessarily mean that it is good one rather than a short one. American constitution is the shortest but the most complete and thriving constitution in the world, despite being the longest one the Indian constitution is not free of constitutional problems that reoccur from time to time.

The major contribution that a constitution can make is to set up a democratic culture, an institution that teaches citizens to respect each other and learn from each other and that makes them active energetic and result oriented performers in already very competitive global economy.

It is more urgent to revive the faith of entrepreneurs, investors and business communities by sweeping reforms of the education system, labour and financial markets, mobilisation of water or other natural resources, creation of physical and economic infrastructure, removing red-tape and making the private sector an active partner in the process of economic growth. Making reward for productivity and raising the opportunity cost of time for more than 50 percent of effectively unemployed is vital step for economic growth. These cannot happen unless the economic growth is the major focus of the constitution and all political forces in the country.

Why cannot Nepal start a really free school system up to the high schools? Why cannot it institute student loans to college and university level students? Why cannot it establish world class universities in mountains and hills using rapid changes in communication technology? Why cannot it focus on manpower development policies that let opportunities for all to develop their full potentials and creative abilities? Why should not it create environments for talented individuals, both the Nepalese and foreigners, to work in Nepal with appropriate reforms in the labour market? Why should not it develop tourism more systematically by making Nepalese Himalayas topmost international standard in holiday destinations? Why should not it focus on developing vast potential hydro electricity for running industries? Why should not it promote the environment for transfer of technology from more advanced neighbours and other developed countries? Why should not it make rules and regulations clearly so that people start thinking that it is the original ideas and thoughts that count most in developing their prospects rather than copying foreign and obsolete ideas? Why should not it start developing financial and other sectors in which Nepal has comparative advantages with more focus on economic growth and creating employment? These are the real concerns that took millions of people to the streets. Delivering them efficiently will make the peaceful revolution and transition of April 2006 memorable and long lasting one”.

Nepalese policy makers need to make many strategic decisions to fulfil promises made to people and to meet their aspirations. Particularly scientific analysis and dynamic scenarios are required for several fundamental issues such as:

- 1) How to reduce poverty in the shortest possible time?
- 2) What is the optimal strategy of growth and capital accumulation? How should the economy invest in physical and human capital required to catch up dynamic neighbours in 10, 20 or 30 years' interval?
- 3) How can it mobilise domestic resources and reduce dependency on foreign aid to raise the rate of investment in the economy? How can it phase out foreign aid and replace it by foreign investment?
- 4) How can it to train manpower and handle surplus labour? How much manpower should it allow to export or how should it create employment at home and reducing effective rate of unemployment of reasonable rate of 5 percent?

- 5) How can it meet energy requirement by developing hydropower or biogas to substitute fossil fuel to mitigate the impact of rising energy prices?
- 6) How can it resettle people from remote areas in order to provide basic needs - food, health, clothes, housing, education, security-to all citizens in more equitable fashion?
- 7) How can it promote private public partnership from primary to university level education so that all young people can begin life from equal starting line?
- 8) How can it assess the role of strategic highways through the Hills and Mountains?
- 9) How can it initiate Lhasa-Kodari-Kathmandu-Raxaul railways or similar low cost airlines for more integration with the Chinese and Indian economies?
- 10) How can it balance social justice, land reform, social security and pension?
- 11) How can it assess capital or labour intensive technologies in agriculture, industries and service? Their impact on income, redistribution and alleviation of poverty?

These long run issues require scenarios based on models that mimic the pattern and structure of consumption, production and income redistribution, trade and financial system of the Nepalese economy. Applied dynamic general equilibrium model of Nepalese economy, game theoretic model of poverty and macroeconomic models for Nepal are presented in the next section in brief. Economic decisions can be better if they are made systematically evaluating all priorities, constraints and feasibilities as outlined in these models.

#### **IV. DYNAMIC MULTI-HOUSEHOLD GENERAL EQUILIBRIUM MODEL OF REPUBLIC OF NEPAL**

Model for new Republic of Nepal should build poverty reduction strategy after a thorough appreciation of the production as well as the consumption sides of the economy and the structure of the markets, government and the foreign sectors. Model of Nepal built on this paper, further improvement from Elbers (1992) and Bhattarai (1997), consists of households grouped in ten categories,  $h_1 \dots h_{10}$ , ranked according to their income status from poorest to the richest, firms grouped in nine different sectors  $i_1 \dots i_9$ , a government that collects taxes from labour and capital income and on use of inputs and on household

income and imposes tariffs on trade with the rest of the world sector. The growth of the economy and distribution of income among households depend on the capital accumulation process and growth rate of productivity of the labour force. More specifically household preferences are given by:

$$\text{Max } U_0^h = \sum_{t=0}^{\infty} \beta^t U_t^h(C_t^h, l_t^h)$$

Subject to

$$\sum_{t=0}^{\infty} R_t^{-1} [P_t(1+t^{vc})C_t^h + w_t(1-t_l)l_t^h] = \sum_{t=0}^{\infty} [(1-t_l)w_tL_t^h + (1-t_k)r_tK_t^h + TR_t^h]$$

where  $C_t^h$ ,  $l_t^h$  and  $L_t^h$  are respectively composite consumption, leisure and labour supplies of household  $h$  in period  $t$ ,  $R_t^{-1} = \prod_{s=0}^{t-1} 1/(1+r_s)$  is a discount factor;  $r_s$  represents the real interest rate on assets at time  $s$ ;  $t^{vc}$  is value added tax on consumption,  $t^l$  is labour income taxes, and  $K_t^h$  is the composite consumption, which is composed of sectoral consumption goods,  $P_t$  is the price of composite consumption (which is based on goods' prices), i.e.  $P_t = \mathcal{G} \prod_{i=1}^n \alpha_i p_{i,t}^{\alpha_i}$ , and  $C_t^h = \prod_{i=1}^n C_{i,t}^{\alpha_i^h}$ .

Industries of the economy are represented by firms that combine both capital and labour input in production and supply of goods and services to the market. Like households firms make production decisions on the basis of intertemporal optimisation:

$$\Pi_{j,t}^y = [((1-\delta_i^e)PD_{i,t}^{\frac{\sigma_y-1}{\sigma_y}} + \delta_i^e PE_{i,t}^{\frac{\sigma_y-1}{\sigma_y}})]^{\frac{1}{\sigma_y-1}} - \theta_j^v PY_{j,t}^v - \theta_j^d \sum_i a_{i,j}^d P_{i,t}$$

where:  $\Pi_{j,t}^y$  is the unit profit of activity in sector  $j$ ;  $PE_{j,t}$  is the export price of good  $j$ ;  $PD_{j,t}$  is the domestic price of good  $j$ ;  $PY_{j,t}^v$  is the price of value added per unit of output in activity  $j$ ;  $\sigma_y$  is a transformation elasticity parameter;  $P_{i,t}$  is the price of final goods used

as intermediate goods;  $\delta_j^e$  is the share parameter for exports in total production;  $\theta_j^v$  is the share of costs paid to labour and capital;  $\theta_j^d$  is the cost share of domestic intermediate inputs;  $a_{i,j}^d$  are input-output coefficients for domestic supply of intermediate goods. Firms are grouped in nine different sectors including agriculture, manufacturing, Chemical, Metal, Gas-electricity and Water, Hotel, transportation and communication and Social services. This is an open economy model in which goods produced at home and foreign countries are considered close substitutes following the Armington assumption, popular in the applied general equilibrium literature and the production process is given by a nested production and trade functions.

The households pay taxes to the government and government returns part of this income to the poor households and spends rest of it to provide public services. The government collects taxes from labour and capital income and on use of inputs and on household income and imposes tariffs on trade with the rest of the world sector and VAT from commodities. Government revenue is collected from a composite tax rate on capital income from each sector, the *ad valorem* tax rate on final consumption by households, and on public consumption and *ad valorem* tax rate on investment, the taxes on labour income of the household, the tax on production, and the tariff on imports. The growth of the economy and distribution of income among households depend on the capital accumulation process and growth rate of productivity of labour force. The government uses taxes and spending strategy to alleviate poverty.

The households pay taxes to the government and government returns part of this income to the poor households and spends rest of it to provide public services.

$$REV_t = \sum_{i,h} t_i^k r_t K_{i,t} + \sum_i t_i^{vc} P_{i,t} C_{i,t}^h + \sum_i t_i^{vg} P_{i,t} G_{i,t} + \sum_i t_i^{vk} P_{i,t} I_{i,t} + \sum_{i,h} t_l^{wLS} P_{i,t}^h + \sum_i t_i^m PM_{i,t} M_{i,t} + \sum_i t_i^p P_{i,t} GY_{i,t} \quad (25)$$

where  $REV_t$  is total government revenue and  $t_i^k$  is a composite tax rate on capital income from sector  $i$ ,  $t_i^{vc}$  is the *ad valorem* tax rate on final consumption by households,  $t_i^{vg}$  is that on public consumption and  $t_i^{vk}$  is the *ad valorem* tax rate on investment,  $t_l$  is the tax rate on labour income of the household,  $t_i^p$  is the tax on production, and  $t_i^m$  is the tariff on imports.

The steady equilibrium growth path of the economy is determined in terms of the interest rate, discount factor and relative prices of goods and factors in which the excess demand for goods and factors are eliminated and resource balance condition holds for the whole economy, each household, the government and rest of the world sectors in each period and over the model horizon. It also shows how the income of each type of household evolves over time as a function of the relative prices of goods and share of households in income. Government policies and transfers can alter this equilibrium. Model contains hundreds of thousands of variables and thousands of equations to express demand and supply in goods and factor markets.

It is impossible to have an explicit analytical solution for a big model like this. Therefore numerical technique is used to solve the model. The steady equilibrium growth path of the economy is determined in terms of the interest rate, discount factor and relative prices of goods and factors in which the excess demand for goods and factors are eliminated and resource balance condition holds for the whole economy, each household, the government and rest of the world sectors in each period and over the model horizon. It also shows how the income of each type of household evolves over time as a function of the relative prices of goods and share of households in income (Figure 2). Government policies and transfers can alter this equilibrium.

## Calibration of the New Nepal Model

The micro-consistency in the model is obtained by making the demand and supply sides balance for each sector in an input-output table maintaining zero profit in equilibrium, balancing the income of households to consumption plus saving, and matching total investment to total savings by the households and revenue and expenditure of the governments. The model is calibrated to the benchmark micro-consistent data contained in this Input-Output Table.

### Input-Output Table of Nepal

Nine Sector Input/Output Table for 1999/00 at Producer's Price (In Million Rs.)

|                         | agri  | manuf  | Chem   | Metal  | asewl  | Hotel  | ransp  | nance  | icServ | Sub-Total | Pcon  | Gcon   | *fxinv | Gfxinv | Stock     | Exp    | Sub-Total | Total Output |
|-------------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-----------|-------|--------|--------|--------|-----------|--------|-----------|--------------|
| agr                     | 694.1 | 1788.6 | 544.5  | 778.5  | 0.0    | 193.6  | 0.1    | 18.8   | 16.6   | 28034.81  | 39.36 | 0.00   | 38.38  | 0.00   | 44488.77  | 142.67 | 150859.18 | 178893.99    |
| Manuf                   | 985.1 | 1550.4 | 35.8   | 457.0  | 9.9    | 211.4  | 46.9   | 171.6  | 127.4  | 12595.40  | 88.15 | 0.00   | 53.43  | 13.87  | -29004.69 | 52.80  | 73853.55  | 86448.95     |
| Chem                    | 730.4 | 22.3   | 684.3  | 419.0  | 15.4   | 27.0   | 16.5   | 0.0    | 84.0   | 4998.92   | 32.07 | 0.00   | 0.00   | 0.00   | -4586.43  | 196.72 | 2342.36   | 7341.28      |
| Metal                   | 900.1 | 87.8   | 25.0   | 1336.2 | 36.3   | 59.3   | 31.4   | 437.5  | 615.4  | 15529.01  | 12.16 | 0.00   | 56.71  | 178.72 | 3741.50   | 114.43 | 87203.52  | 102732.52    |
| Gasewl                  | 10.4  | 612.1  | 34.1   | 316.1  | 118.8  | 310.3  | 62.4   | 80.5   | 112.8  | 1657.32   | 34.16 | 0.00   | 0.00   | 0.00   | 4823.23   | 0.00   | 6507.39   | 8164.71      |
| Hotel                   | 195.0 | 1104.7 | 244.2  | 1335.4 | 84.2   | 1507.7 | 1841.8 | 746.8  | 797.6  | 24857.42  | 52.98 | 0.00   | 84.95  | 46.78  | 10552.47  | 147.44 | 46484.62  | 71342.04     |
| Transp                  | 305.3 | 1582.2 | 407.5  | 1566.2 | 103.8  | 284.7  | 1506.1 | 666.8  | 501.5  | 28424.08  | 38.88 | 0.00   | 84.96  | 37.51  | 9603.27   | 124.96 | 33359.59  | 61783.67     |
| Finance                 | 294.7 | 1279.1 | 253.9  | 1062.6 | 143.2  | 902.2  | 1340.7 | 383.3  | 009.8  | 28669.54  | 76.25 | 0.00   | 0.00   | 0.00   | 3043.02   | 0.00   | 12619.27  | 41288.80     |
| SocServ                 | 164.5 | 367.8  | 21.4   | 1204.3 | 20.0   | 404.4  | 146.2  | 449.7  | 429.3  | 7207.70   | 37.13 | 179.00 | 0.00   | 0.00   | -14416.39 | 41.02  | 48610.76  | 55818.46     |
| DOMESTIC INPUT PURCHASE | 79.50 | 184.95 | 50.70  | 175.37 | 31.57  | 100.59 | 192.05 | 154.98 | 184.48 | 151974.19 | 31.13 | 179.00 | 118.43 | 176.89 | 28244.76  | 120.03 | 461840.24 | 613814.43    |
| intimp                  | 47.48 | 182.69 | 90.90  | 174.26 | 177.08 | 173.06 | 150.97 | 108.48 | 181.46 | 80686.38  | 32.38 | 0.00   | 79.00  | 168.00 | 0.00      | 0.00   | 40929.38  | 121615.76    |
| TOTAL INTER INPUT       | 26.98 | 177.64 | 41.60  | 49.63  | 108.65 | 173.64 | 143.03 | 163.46 | 175.94 | 232660.57 | 33.52 | 179.00 | 97.43  | 144.89 | 28244.76  | 120.03 | 502769.62 | 735430.19    |
| Wages                   | 12.74 | 116.98 | 121.65 | 182.06 | 101.44 | 174.29 | 152.75 | 134.58 | 121.74 | 132508.23 | 0.00  | 0.00   | 0.00   | 0.00   | 0.00      | 0.00   | 0.00      | 132508.23    |
| Depr                    | 21.62 | 192.75 | 07.44  | 84.01  | 117.71 | 172.39 | 182.37 | 170.36 | 66.71  | 15517.36  | 0.00  | 0.00   | 0.00   | 0.00   | 0.00      | 0.00   | 0.00      | 15517.36     |
| Indx                    | 44.01 | 187.31 | 178.38 | 164.20 | 61.06  | 159.39 | 159.64 | 6.35   | 118.52 | 15688.86  | 33.48 | 0.00   | 113.57 | 91.11  | 0.00      | 140.97 | 9209.14   | 24998.00     |
| capital                 | 98.64 | 164.28 | 192.22 | 52.61  | 175.85 | 162.32 | 45.88  | 14.06  | 133.55 | 217439.41 | 0.00  | 0.00   | 0.00   | 0.00   | 0.00      | 0.00   | 0.00      | 217439.41    |
| VALUE ADDED             | 67.01 | 171.31 | 199.68 | 182.89 | 156.06 | 168.39 | 140.64 | 125.35 | 142.52 | 381153.86 | 33.48 | 0.00   | 113.57 | 91.11  | 0.00      | 140.97 | 9209.14   | 390363.00    |
| GRAND TOTAL             | 93.99 | 148.95 | 141.28 | 32.52  | 64.71  | 142.04 | 183.67 | 188.80 | 118.46 | 613814.43 | 47.00 | 179.00 | 111.00 | 136.00 | 28244.76  | 61.00  | 511978.76 | 1125793.19   |

Reference: Adapted from 25 sector input-output model of Nepal received from the NPC Secretariate, Kathmandu (cortesy Puspaha Shakya)..

### Key parameters of the model based on previous modelling literature

|   |      |
|---|------|
| city of substitution between labour and capital | 3.0  |
| city of substitution between labour and leisure | 1.5  |
| city of substitution consumption and leisure    | 0.5  |
| with rate of output                             | 0.02 |
| mark interest rate                              | 0.05 |
| f depreciation                                  | 0.07 |
| city of intertemporal substitution              | 1.1  |
| city in government consumption                  | 1.0  |

The sectoral composition of consumption by households is approximated by the net of tax and transfer income of households that are assumed to remain same across all goods. In addition economic survey data is used for the estimates of the distribution of wage, interest rate and transfer income for households.

### Policy Scenarios

The income redistribution effect in the model occurs through the differentiated tax rates of household income, value added taxes on consumption of goods and services, on

labour and capital income. All these tax experiments constrain the amount of revenue and find the best optimal rates of taxes given the revenue requirement preset by the policy maker. In the above benchmark labour and capital input taxes are replaced by uniform rates of 0.3 and 0.2 in the counterfactual scenarios. Model solutions show how these reforms affect the growth rates of the various sectors of the economy and distribution of income and welfare among households.

All these model scenarios of the growing Nepalese economy are distorted by taxes in the benchmark that are removed under the counterfactual scenarios. It is obvious that tax reform alone cannot bring desired growth in income of households in developing country like Nepal which requires more investment in human capital and physical infrastructure. Piecemeal and patchy reforms will not be able to generate substantial growth enough to meet the aspirations of people. Wide ranging income and substitution effects through all markets need to be taken account.

The rich institutional structure contained in forward-looking CGE models allows one to experiment with many structural assumptions characterizing the particular economy under investigation. Therefore this framework is definitely an improvement over the fixed coefficient Harrod-Domar growth model or one sector neoclassical growth models or one sector endogenous growth model. So is it to the static and sequential dynamic CGE models available in the literature. Specification of a multi-sectoral wedge in the cost of capital and its impact on the economy over the period is a new approach for analysis of distortions and liberalization of decentralized market economy. This is an important empirical tool to study long run growth and distribution in an inter-temporal and inter-sectoral framework.

The dynamic general equilibrium framework contained in the base-line model can be applied to analyze several other issues of the Nepalese economy particularly related to study the impacts of fiscal reforms or of liberalization of international trade, or of policies

on labour markets and human resource development aimed at alleviation of poverty. It can be modified to study migration, regional and sectoral developments, and parallel markets. Implications of tax reforms on welfare of each category of household are given in Figure 2. Impacts on output, capital accumulation, investment, relative prices, interest rates, wage rates, imports, exports and public sector balances for entire model horizon is too much to present in the space available in this paper.

## V. GAME THEORETIC MODEL OF POVERTY

Allocations should be incentive compatible for rich and poor households and the governments to interact cooperatively in the poverty alleviation game. The solutions of the game when cooperative strategies are incentive compatible for them are consistent to poverty alleviation objectives while the catastrophic results may occur when non-cooperative strategies are become optimal for individual players. In a utility or welfare maximising world, model results will be based on comparison of expected welfare contingent on their strategies (Vaughan (1987), Pryatt (1987), Desai and Shah (1988), Myles (2001)).

### Model of the Poverty Game

There are three players in the poverty game -poor, rich and government; each has three strategies available to it to play,  $s$ ,  $l$ , and  $k$ , cooperation, indifference and non cooperation. The outcome of the game is the strategy contingent income for poor and rich,  $y_t^p(s, l, k)$  with the probability of being in particular state like this is given by  $\pi_t^p(s, l, k)$  and  $\pi_t^R(s, l, k)$  respectively and tax and transfer profiles associated to them. The state-space of the game rises exponentially with the length of time period  $t$ . The objective of these rich and poor households is to maximize the expected utility that is assumed to be concave in income. The government can influence this outcome by choices of taxes and transfers that can be liberal, normal or conservative. More specifically, following propositions should hold in this poverty alleviation game.

**Proposition 1:** The state contingent expected money metric utility of poor is less than that of rich, which can be expressed as:

$$\sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^p(s, l, k) \cdot \delta_t^p u(y_t^p(s, l, k)) < \sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^R(s, l, k) \cdot \delta_t^R u(y_t^R(s, l, k))$$

where  $\pi_t^p(s, l, k)$  gives the probability of choosing one of strategies by poor given that the rich and the government has chosen  $l$  and  $k$  strategies. Utility is derived from income as given by  $u(y_t^p(s, l, k))$  and  $\delta_t^p = \frac{1}{(1+r_t^p)}$  is the discount factors for poor and  $\delta_t^R = \frac{1}{(1+r_t^R)}$  the discount factor for rich.

**Proposition 2:** Transfer raises money metric expected utility of poor and reduces the utility of rich.

$$\sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^p(s, l, k) \cdot \delta_t^p u(y_t^p(s, l, k) + T_t^p(s, l, k)) < \sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^R(s, l, k) \cdot \delta_t^R u(y_t^R(s, l, k) - T_t^p(s, l, k))$$

**Proposition 3:** Incentive compatibility requires that

$$\sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^p(s, l, k) \cdot \delta_t^p u(y_t^p(s, l, k) + T_t^p(s, l, k)) > \sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^p(s, l, k) \cdot \delta_t^p u(y_t^p(s, l, k))$$

and

$$\sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^R(s, l, k) \cdot \delta_t^R u(y_t^R(s, l, k) - T_t^p(s, l, k)) < \sum_{s=1}^s \sum_{l=1}^l \sum_{k=1}^k \sum_t^T \pi_t^R(s, l, k) \cdot \delta_t^R u(y_t^R(s, l, k))$$

**Proposition 4:** Growth requires that income of both poor and rich are rising over time:

$$\begin{aligned} T_t^p(s, l, k) &< T_{t+1}^p(s, l, k) < T_{t+2}^p(s, l, k) < \dots < T_{t+T}^p(s, l, k) \\ Y_t^p(s, l, k) &< Y_{t+1}^p(s, l, k) < Y_{t+2}^p(s, l, k) < \dots < Y_{t+T}^p(s, l, k) \\ Y_t^R(s, l, k) &< Y_{t+1}^R(s, l, k) < Y_{t+2}^R(s, l, k) < \dots < Y_{t+T}^R(s, l, k) \end{aligned}$$

**Proposition 5:** Termination of poverty requires that every poor individual has at least the level of income equal to the poverty line determined by the society. When the poverty line is defined one half of the average income this can be stated as:

$$Y_{t+T}^p(s, l, k) \geq \frac{1}{2} \sum_{p=1}^p Y_{t+T}^p(s, l, k)$$

Above five propositions comprehensively incorporate all possible scenarios in the poverty game mentioned above. Propositions 2-5 present optimistic scenarios for a chosen horizon  $T$ . Testing above propositions in a real world situation is very challenging exercise. It requires modelling of the entire state space of the economy. Moreover in real situation consumers and producers are heterogeneous regarding their preferences, endowments and technology and economy is more complicated than depicted in the model above. In essence it requires a general equilibrium set up of an economy where poor and rich households participate freely in economic activities taking their share of income received from

supplying labour and capital inputs that are affected by tax and transfer system as illustrated in the next section.

## **VI. MACROECONOMIC MODEL OF NEPAL FOR FORECASTING**

Keynesian Macroeconomic model: Starting point of the Keynesian macroeconomic models in the national income identity from the demand or expenditure side, income side or the supply side. Given the information on ratios of consumption, investment, government expenditure and trade balances to the GDP and behavioural assumption about the consumption, investment and net trade functions policy makers can consider impacts of fiscal and monetary policies in output, employment and savings and investment activities in the economy. Multiplier and accelerator analysis is carried out based on key structural parameters such as the marginal propensity to consume, productivity of capital, sensitivity of trade to the real exchange rates. After the emergence of the new classical and new Keynesian approaches more focus is kept in the supply side of the economy. These models are popular because they are simple and easy to understand and implement various policy scenarios regarding the projection of resources or resource gaps in an economy.

In the context of Nepal growth rates were determined for each five year plans since 1950. Resource requirement is estimated using the Harrod-Domar growth model in which with crude estimates on the productivity of capital (incremental capital output ratio). Resource gap of the economy is projected with rough and ready estimates of the domestic saving rates (some times based on family expenditure survey). On the monetary side Nepal has adopted a fixed exchange rate regime with India with restriction in the capital mobility. Though demand for money is growing with greater degree of marketisation due to development in transport and communication networks in recent years, money supply grew faster than the demand for money as the most government have pursued expansionary fiscal policy in process of implementing plans and programmes beyond their revenue raising ability. Ministry of Finance, National Planning Commission, and the Nepal Rastra Bank have their one version of simple macroeconomic models. Basically this simple model involves comparison of big ratios of the economy. Multilateral and bilateral development organisations, such as the World Bank, Asian Development Bank, USAID, DFID, JICA or CIDA or UNDP have their own version of macroeconomic model of Nepal which they use in process of evaluating development assistance programme to Nepal.

Macro economic models aim to explain the level of aggregate demand, employment, interest rates, price level, trade balances, consumption, investment and saving activities of the households and firms and government expenditure and net exports. Keynesian models assume the aggregate supply to be perfectly flexible in the short run with a constant level of prices. Behavioural parameters such as the marginal propensities to consume and import and tax rates determine the impact of policy in the real sectors of the economy. A simple version of Keynesian model can briefly be explained in terms of 12 equations as presented in this section.

Consumption, the major component of the aggregate demand, is determined by disposable income as following

$$C_t = \beta_0 + \beta_1(Y_t - T_t) \quad (1)$$

where  $C_t$  is consumption,  $Y_t$  is the national income,  $T_t$  is the tax rate. Parameters  $\beta_0$  and  $\beta_1$  represent the consumption behaviour in this model;  $\beta_0$  can be considered as the level of consumption for subsistence and  $\beta_1$  representing the marginal propensity to consume out

of disposable income has value between 0 and 1;  $0 < \beta_1 = \frac{\partial C}{\partial Y} < 1$

Investment is another major component of aggregate demand. In simplest form the investment demand is determined by the rate of interest, the cost of capital and the change in the demand in the previous period as:

$$I_t = \mu_0 + \mu_1 R_t + \phi \Delta Y_{t-1} \quad (2)$$

where  $I_t$  is investment demand,  $R_t$  is the rate of interest,  $\Delta Y_t$  is the change in demand, i.e.

$\Delta Y_{t-1} = Y_t - Y_{t-1}$ . Interest rate denotes the cost of capital and determines the level of

investment, as shown by  $\mu_1 = \frac{\partial I}{\partial R} < 0$ . Producers invest more if there is more aggregate

demand,  $\phi = \frac{\partial I}{\partial Y} > 0$ .

The government demand ( $G_t$ ) and exports ( $X_t$ ) are other two components of aggregate demand. The  $G_t$  component is fixed because the government has commitment to a set of public services which cannot be easily altered. The  $X_t$  may be determined by the real exchange rate and the foreign income. We assume that both  $G_t$  and  $X_t$  as exogenous variables in the model.

Imports provide for part of these demand as all goods and services consumed or invested in the economy cannot be produced at home. Most of Keynesian models relate imports to level of domestic income and the real exchange rate:

$$M_t = m_0 + m_1 Y_t + m_2 \lambda_t \quad (3)$$

$M_t$  is the imports and  $\lambda_t$  is the real exchange rate may be defined as  $\lambda_t = \frac{eP}{P^*}$  where  $e$  is the nominal exchange rate,  $P$  is the domestic price level and  $P^*$  is foreign price level. Parameters  $m_0$ ,  $m_1$  and  $m_2$  represent import behaviour of the economy. Import rises with a rise in the level of national income,  $\frac{\partial M}{\partial Y} = m_1 > 0$ , and the real exchange rate

$\frac{\partial M}{\partial \lambda} = m_2 > 0$ . Higher real exchange rate makes the domestic economy less competitive in

the world. Nominal exchange rate may not always be aligned with the real exchange rate. The purchasing power parity theory implies that currency should appreciate (depreciate) if the domestic inflation rate is lower (higher) than the foreign inflation rate. Evidence suggests that PPP holds in the long run but the risk adjusted uncovered interest parity theory is more appropriate for the short run.

Macroeconomic balance requires the aggregate demand to be equal to aggregate income. Households use part of their income in consumption, other parts to pay taxes or to save as:

$$Y_t = C_t + T_t + S_t \quad (4)$$

This equation defines income constraint of an economy. An economy with more consumption has less amount for saving or taxes or both.

Most often the collection of taxes by the government is mainly determined by the level of income as:

$$T_t = t_0 + t_1 Y_t \quad (5)$$

here  $t_0$  is the collection of lump sum taxes and  $t_1$  is the tax rate proportional to the national

$$\text{income, } \frac{\partial T}{\partial Y} = t_1 > 0.$$

The national income identity emerges by putting all above features together from income and demand sides as:

$$C_t + T_t + S_t = Y_t = C_t + I_t + G_t + X_t - M_t \quad (6)$$

where the left hand side represents components of national income and the right hand side represents components of aggregate demand. This also implies that the net national saving, public plus private net savings, should equal the current account balance of the economy, which is often called the fundamental identity of an economy.

$$(T_t - G_t) + (S_t - I_t) = (X_t - M_t) \quad (7)$$

If the net public spending is bigger than the net private saving, it is met by net capital inflow. A country which is less credit worthy or has accumulated heavy debt will not be able to finance its deficit by borrowing from abroad. Imbalances between revenue and government spending represents a change in the national debt  $\Delta B_t = (T_t - G_t)$  and debt accumulates over time  $B_t = \Delta B_t + rB_{t-1}$ . Trade imbalances result in external debt

$\Delta D_t = (X_t - M_t)$  and debt accumulates over time  $D_t = \Delta D_t + rD_{t-1}$ . Persistence in budget or trade imbalances results in massive accumulation of debt.

Equations (1) to (7) represent the real sector in the Keynesian model, where  $Y_t$ ,  $C_t$ ,  $M_t$ ,  $I_t$ ,  $R_t$  and  $T_t$  are endogenous variables and  $\Delta Y_{t-1}$ ,  $G_t$ ,  $X_t$  and  $\lambda_t$  are predetermined or exogenous variables. It assumes that the aggregate supply is fixed in the short run and output is completely determined by the demand side of the economy. Fluctuations in consumption, investment, government consumption or exports are the sources of fluctuation in income and employment in the short run. Hicks(1937) formalised the Keynesian analysis in terms of investment saving and money market equilibrium, IS-LM model in which the IS curve represents the equilibrium in the goods market (IS) given the aggregate supply by a production function,  $Y_t = F(\bar{K}_t, L_t)$  in which variation in output is due to variation in employment as the capital stock is fixed in the short run.

National income consistent with equilibrium in the saving and investment (the IS curve) is derived by using (1), (2) and (5) in (6)  $\bar{Y}_t = C_t + I_t + G_t + X_t - M_t$  and substituting all demand components (1) to (4) in (5).

$$Y_t = \frac{\beta_0 - \beta_1 c_0 + \mu_0 - m_0 + G_t + X_t}{1 - \beta_1 + \beta_1 t_1 + m_1} + \frac{\mu_1 R_t}{1 - \beta_1 + \beta_1 t_1 + m_1} + \frac{\phi \Delta Y_{t-1}}{1 - \beta_1 + \beta_1 t_1 + m_1} \quad (8)$$

The first part on the right hand side shows impacts on output due to changes in exogenous or policy variables, the second component shows how the aggregate demand increases (decrease) with low (high) real interest rate, since  $\mu_1 < 0$ . The third component gives the dynamics of income, the acceleration effect of increase in income in the previous period (we  $\Delta Y_{t-1} = 0$  in our first two tables).

We take the above investment saving equilibrium (IS) model of Keynes can be solved for various policy issues tax cut scenario where taxes either rise or fall; a tax cut will have

expansionary impact on output, consumption and imports. One may expect that government budget surplus to decrease after the tax cut as the government revenue falls due to the lower rate of tax though it rises due to expansion in income which may lead to more collection of taxes after an increase in income. Tax cut results in trade deficit as imports rise while exports are fixed at exogenous level.

Raising government spending can have significant impact on output and hence in tax revenue, consumption and imports. It also worsens the trade balance. The national saving fall because of deficit in government budget and balance of payment situation becomes worse as imports rise due to increase in income. When both tax and government spending rise it has more pronounced expansionary impact in the economy. The marginal propensities to consume (MPC) and import (MMM) are very important. While the higher MPC implies more expansion of demand in response to any policy induced or autonomous changes in the system, higher propensity to import implies more leakages of resources from the economy, which sets a contractionary impact to the domestic economy. Higher export like expansion in the government spending has an expansionary impact in the economy.

So far we have taken only the real sector of the economy. More realistic model should take account of both real and monetary sectors. This is done by integrating the monetary and sectors with the goods market presented above under the IS-LM model. The monetary sector has to complement the real side of the economy. Keynes considers that total liquid wealth is divided either in money or bonds. The demand for money arises for transaction, precautionary or speculative purposes. Higher level of income raises the precautionary and transaction demand for money and higher rate of interest reduces demand for money by raising the opportunity cost of holding money. Putting these things together the money demand function takes the following form:

Money demand function: 
$$\left(\frac{\overline{MM}}{P}\right)_t = b_0 + b_1 Y_t - b_2 R_t \quad (9)$$

Money supply  $\overline{MM}_t$  is considered a policy variable to be determined by a monetary authority. In every period the rate of interest is set so that the demand for money equals the supply of money. Since the price level is assumed to be fixed both the real and nominal interest rates are equal. The money market equilibrium implies

$$R_t = \frac{b_0}{b_2} - \frac{1}{b_2} \left(\frac{\overline{MM}}{P}\right)_t + \frac{b_1}{b_2} Y_t. \quad (10)$$

The intersection points of the IS curve and the LM curves give the overall equilibrium that satisfy both goods and money market equilibrium, this is also the aggregate demand.

Substitute (10) in (8) to find out the level of output and the interest rate consistent with simultaneous equilibrium in goods as well as money markets.

$$Y_t = \frac{b \left( \beta_0 - \beta_{10} + \mu_0 - m_0 + G_t + X_t \right)}{\left( 1 - \beta_1 + \beta_{11} + m_1 \right) b_2 - \mu_{11}} + \frac{b_2 \phi \Delta Y_{t-1}}{\left( 1 - \beta_1 + \beta_{11} + m_1 \right) b_2 - \mu_{11}} + \frac{b_2 \mu_1}{\left( 1 - \beta_1 + \beta_{11} + m_1 \right) b_2 - \mu_{11}} \left[ \frac{b_0}{b_2} - \frac{1}{b_2} \left(\frac{\overline{MM}}{P}\right)_t \right] \quad (11)$$

This is also an aggregate demand function in the Keynesian model which is downward sloping in prices. The equilibrium interest rate is found using the aggregate demand (11) equation in the money market equilibrium condition (10). The interest rate and the level of income are consistent with the equilibrium in both the goods and money markets. No gap remains to be covered between the demand and supply. It becomes a static model if  $\Delta Y_{t-1}$  term is left out.

$$R_t = \frac{b_0}{b_2} - \frac{1}{b_2} \left(\frac{\overline{MM}}{P}\right)_t + \frac{b_1}{b_2} \left[ \frac{b \left( \beta_0 - \beta_{10} + \mu_0 - m_0 + G_t + X_t \right)}{\left( 1 - \beta_1 + \beta_{11} + m_1 \right) b_2 - \mu_{11}} + \frac{b_2 \phi \Delta Y_{t-1}}{\left( 1 - \beta_1 + \beta_{11} + m_1 \right) b_2 - \mu_{11}} + \frac{b_2 \mu_1}{\left( 1 - \beta_1 + \beta_{11} + m_1 \right) b_2 - \mu_{11}} \left[ \frac{b_0}{b_2} - \frac{1}{b_2} \left(\frac{\overline{MM}}{P}\right)_t \right] \right] \quad (12)$$

Finally, model with a change in income term,  $\Delta Y_{t-1} = Y_{t-2} - Y_{t-1}$ , would be a multiplier accelerator dynamic IS-LM model. Stating from an initial condition such as  $Y_{t-1} = Y_0$ , not only the current demand but also the past demand will determine the current equilibrium. This happens because of the adjustment process in investment. If  $\Delta Y_t$  was positive for a

given time  $t$ , depending on the parameter  $\phi$ , in the current formulation, investment component will change.

In a simultaneous system any change in one variable will have repercussion in all other variables. The dynamic path for income over years can be simulated using this equation. More appropriately, as above, one should use both goods and money market equilibrium conditions to do this simulation by modifying the exogenous or policy variables such as the government spending  $G_t$  or the level of exports  $X_t$ .

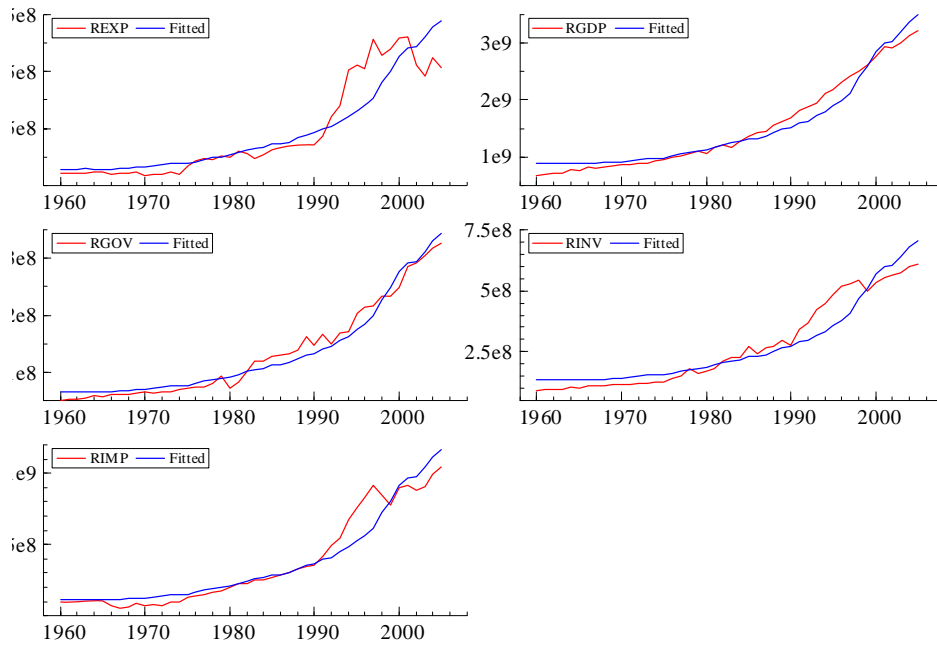
The model solutions in response to various policy changes as presented in the above table show that the both fiscal and monetary policy can have significant impact in the economy. These results are subject to the set of parameters presented above. Behaviour of households and importers can have most dramatic macroeconomic effects are shown by the scenarios for lower MPC and higher MPM, both of which are contractionary.

The above tables show comparative static effect of a policy change. This model also can be made recursively dynamic setting a dynamic path for income and the interest rate, consumption, investment, tax revenue and imports by introducing monetary, fiscal and exchange rate policy rule for the economy. However, more information is needed on policy (exogenous) variables on exports and government expenditure, two major exogenous variables in the current model. This model could also be used to study a structural shift in the components of GDP by changing the slopes and intercept parameters, which ideally should come from an econometric estimation.

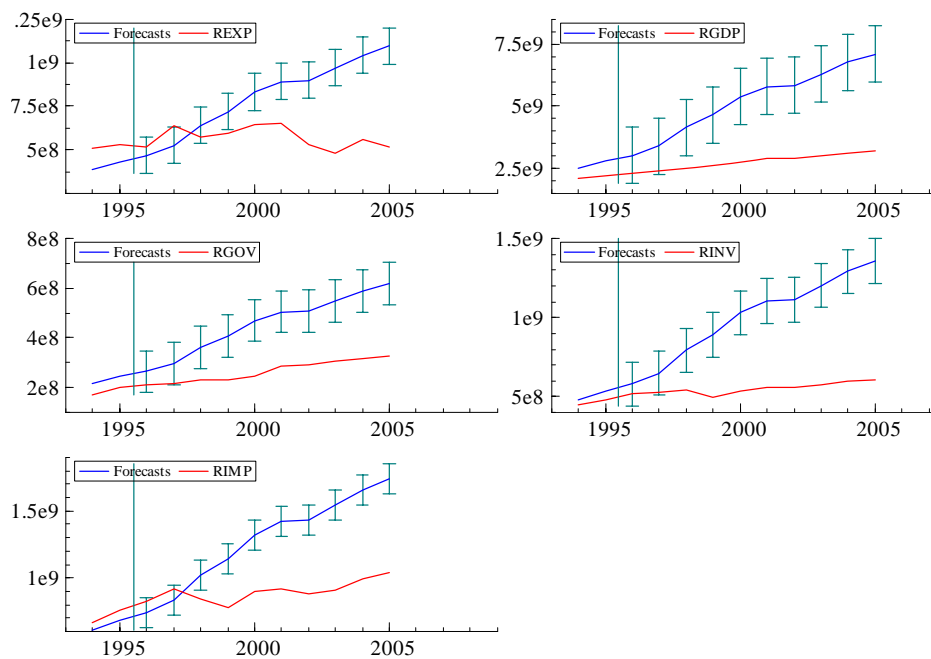
The aggregate demand (AD) can be derived from the IS-LM model by tracing out the economy in response change in the prices. A downward sloping AD implied that the aggregate spending decreases in higher prices. This happens because of reduced real balances, appreciation of domestic currency and reduction in external demand for goods, or by lowering the expectations of income among people.

Above model can be applied to real economy using the macroeconomic time series data and applied fore economic forecasting and simulation as following:

### Forecast of Key Macroeconomic Variable of Nepal



### Historical Simulation of Key Macroeconomic Variable of Nepal



## VII. CONCLUSIONS

Transformation from feudalism to full fledged liberal democracy is proving a very difficult transition despite very successful election for the Constituent Assembly and declaration of the Republic of Nepal on May 28, 2008. New constitution should promote politics of reconciliation based on broader national interest removing the possibilities of conflicts based on narrow party centred non-ideological ethnic and regional interests. Game of cooperation, coexistence and tolerance should be a nature rather than compulsion forced by the lack of a clear majority of any political party in the CA in the Republic of Nepal. Economic plans and programmes based on more scientific modelling for all households, regions and ethnic groups and entrepreneurs in a more decentralised and efficient dynamic market economy only can fulfil aspiration of those 27 million Nepalese people. Unflinching commitment of political and economic participants on grow Nepal contract based on more farsighted dynamic equilibrium models or on game theories or in macroeconomic models that can tracking the past and projecting the future more accurately should be norms in decision making. Speedy rate of growth with redistribution to alleviate poverty should be the top agenda of new constitution that will truly open Nepal's way for advancement in the 21<sup>st</sup> century more competitively together with her neighbours China and India in coming years.

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## Constituencies won by political parties for all 75 District under First Past the Post (FPTP) Election for the Constituent Assembly

|               | Communist Party of Nepal (Maoists) |               |              | Communist Party of Nepal (UML) | Madhesi People's Rights Forum, Nepal | Tarai Madhes Loktantrik Party | Nepali Congress |   |
|---------------|------------------------------------|---------------|--------------|--------------------------------|--------------------------------------|-------------------------------|-----------------|---|
| Jhapa         | 1 Dhading                          | 2 Lamjung     | 1 Jajarkot   | 1 Jhapa                        | 6 Morang                             | 4 Mahottari                   | 3 Taplejung     | 1 |
| Jhapa         | 2 Dhading                          | 3 Kaski       | 1 Jajarkot   | 2 Sankhuwasabha                | 2 Morang                             | 5 Mahottari                   | 4 Paanchthar    | 1 |
| Jhapa         | 3 Nuwakot                          | 1 Kaski       | 2 Surkhet    | 3 Sunsari                      | 2 Morang                             | 6 Sarlahi                     | 3 Ilam          | 3 |
| Jhapa         | 4 Nuwakot                          | 3 Kaski       | 4 Banke      | 1 Sunsari                      | 6 Morang                             | 7 Rautahat                    | 5 Jhapa         | 5 |
| Jhapa         | 7 Kathmandu                        | 2 Tanahu      | 1 Banke      | 4 Sindhuli                     | 1 Sunsari                            | 3 Bara                        | 4 Tehrathum     | 1 |
| Sankhuwasabha | 1 Kathmandu                        | 6 Gulmi       | 1 Bardiya    | 1 Dhanusha                     | 1 Sunsari                            | 4 Nawalparasi                 | 6 Morang        | 1 |
| Bhojpur       | 1 Kathmandu                        | 7 Gulmi       | 3 Bardiya    | 2 Dhanusha                     | 7 Sunsari                            | 5 Kapilvastu                  | 2 Udaypur       | 1 |
| Bhojpur       | 2 Kathmandu                        | 10 Palpa      | 2 Bardiya    | 3 Sarlahi                      | 1 Saptari                            | 1 Kapilvastu                  | Dhanusha        | 2 |
| Dhankuta      | 1 Lalitpur                         | 1 Arghakhanda | 1 Bardiya    | 4 Sarlahi                      | 2 Saptari                            | 2 Kapilvastu                  | Dhanusha        | 3 |
| Dhankuta      | 2 Lalitpur                         | 2 Nawalparasi | 3 Achham     | 2 Kavrepalanchok               | 3 Saptari                            | 4                             | Dhanusha        | 5 |
| Morang        | 2 Lalitpur                         | 3 Nawalparasi | 4 Bajhang    | 2 Parsa                        | 4 Saptari                            | 6                             | Nuwakot         | 2 |
| Morang        | 3 Kavrepalanchok                   | 1 Rupandehi   | 1 Doti       | 2 Chitwan                      | 1 Siraha                             | 1                             | Kathmandu       | 1 |
| Morang        | 8 Kavrepalanchok                   | 2 Myagdi      | 1 Kailali    | 1 Lamjung                      | 2 Siraha                             | 2                             | Kathmandu       | 3 |
| Morang        | 9 Kavrepalanchok                   | 4 Parvat      | 2 Kailali    | 2 Kaski                        | 3 Siraha                             | 3                             | Kathmandu       | 4 |
| Sunsari       | 1 Sindhupalchok                    | 1 Rukum       | 1 Kailali    | 3 Tanahu                       | 3 Siraha                             | 4                             | Kathmandu       | 5 |
| Solukhumbu    | 1 Sindhupalchok                    | 2 Rukum       | 2 Kailali    | 4 Syangja                      | 1 Siraha                             | 6                             | Kathmandu       | 8 |
| Khotang       | 1 Sindhupalchok                    | 3 Rolpa       | 1 Kailali    | 5 Gulmi                        | 2 Dhanusha                           | 4                             | Kathmandu       | 9 |
| Khotang       | 2 Makwanpur                        | 1 Rolpa       | 2 Kailali    | 6 Palpa                        | 1 Mahottari                          | 2                             | Rautahat        | 2 |
| Okhaldhunga   | 1 Makwanpur                        | 2 Pyuthan     | 1 Darchula   | 1 Palpa                        | 3 Mahottari                          | 5                             | Rautahat        | 4 |
| Okhaldhunga   | 2 Makwanpur                        | 3 Pyuthan     | 2 Baitadi    | 1 Rupandehi                    | 4 Sarlahi                            | 6                             | Bara            | 5 |
| Udayapur      | 2 Makwanpur                        | 4 Salyan      | 1 Baitadi    | 2 Rupandehi                    | 5 Bara                               | 3                             | Parsa           | 2 |
| Udayapur      | 3 Rautahat                         | 3 Salyan      | 2 Kanchanpur | 1 Mustang                      | 1 Parsa                              | 1                             | Parsa           | 3 |
| Siraha        | 5 Rautahat                         | 6 Dang        | 1 Kanchanpur | 2 Baglung                      | 1 Nawalparasi                        | 5                             | Parsa           | 5 |
| Dolakha       | 1 Bara                             | 2 Dang        | 2 Kanchanpur | 3 Dailekh                      | 2 Rupandehi                          | 2                             | Tanahu          | 2 |
| Dolakha       | 2 Bara                             | 6 Dang        | 3            | Surkhet                        | 1 Rupandehi                          | 6                             | Syangja         | 2 |
| Ramechhap     | 1 Chitwan                          | 2 Dang        | 4            | Surkhet                        | 2 Rupandehi                          | 7                             | Syangja         | 3 |
| Ramechhap     | 2 Chitwan                          | 3 Dang        | 5            | Achham                         | 1 Kapilvastu                         | 5                             | Arghakhanchi    | 2 |
| Sindhuli      | 2 Chitwan                          | 4 Dolpa       | 1            | Bajhang                        | 1 Banke                              | 2                             | Nawalparasi     | 1 |
| Sindhuli      | 3 Gorkha                           | 1 Mugu        | 1            | Doti                           | 1 Banke                              | 3                             | Nawalparasi     | 2 |
| Dhanusha      | 6 Gorkha                           | 2 Jumla       | 1            |                                |                                      |                               | Rupandehi       | 3 |
| Rasuwa        | 1 Gorkha                           | 3 Kalikot     | 1            |                                |                                      |                               | Kapilvastu      | 1 |
| Dhading       | 1 Manang                           | 1 Humla       | 1            |                                |                                      |                               | Baglung         | 3 |
|               |                                    |               |              |                                |                                      |                               | Parvat          | 1 |
|               |                                    |               |              |                                |                                      |                               | Dailekh         | 1 |
|               |                                    |               |              |                                |                                      |                               | Bajura          | 1 |
|               |                                    |               |              |                                |                                      |                               | Dadeldhura      | 1 |
|               |                                    |               |              |                                |                                      |                               | Kanchanpur      | 4 |

