

Land Reform in Nepal: Equity, Efficiency and Economy

(ネパールに於ける農地改革
ー公平性・効率性・経済へ及ぼす効果の数量経済分析ー)

ダマル バラバ パウデル

Land Reform in Nepal: Equity, Efficiency and Economy

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Summary

Land reform is a hot and live issue in Nepal. About one third of the population is landless or near landless with very low standard of living. The political parties of Nepal have agreed that they should address the land reform issue in a scientific way. Even land laws are there but the proper implementation is always lacking. In this aspect, this study evaluates if land reform laws were implemented properly what would happen mainly in three aspects in Nepal- the impacts on equity, efficiency and the whole economy.

In this research, micro as well as macro perspectives are used and linked together. From micro perspectives, latest Nepal living standard survey 2010/11 data, welfare function for redistributive reform, Cobb-Douglas production frontier function and data envelopment analysis are used. Moreover, as the part of this research work, input-output (IO) table and social accounting matrix (SAM) of Nepal for 2010/11 are estimated. Since, there is no authentic IO table and SAM for Nepal published by government agency, estimation of fresh IO table and SAM has great importance for Nepal. Then using the results of micro studies of chapter three and chapter four, the economy-wide impacts of land reform are studied using IO and SAM framework. Furthermore, in chapter five and in appendix 5A, the micro-simulation impacts of land reform on macro-economy of Nepal are analyzed using both SAM (in chapter five) and IO (in appendix 5A) framework. Furthermore, it is claimed that this type of study is novel in literature as well as in case of Nepal and has great significance for policy.

The main motivation of this research is to evaluate the impact of implementation of current land reform policies in Nepal using micro-simulation macro-effect approach. To address the motivation, three research questions are set in chapter one as- Does land reform increase household equity and welfare in Nepal? How land reform implementation can reduce inefficiency in Nepalese agriculture? What is the impact of land reform in Nepalese macro economy? Then, the answers of these three research questions are explored in three core

chapters. Chapter three explores the answer to the first research question, chapter four explores the answer to the second research question and chapter five and appendix 5A explore the answer to third research question. Additionally, chapters one and two give background, theories, experiences, current situations and literatures on land reform to support the core chapters.

To answer the first research question, micro level latest household survey data from Nepal are used to estimate income and consumption functions in chapter three as household welfare functions taking household own land size as main policy variable. Furthermore, using the estimated welfare function equations of both types (income and consumption), the current land ceiling policy of Government of Nepal is simulated to find the impact of redistributive land reform on per capita household income and consumption. Similarly, poverty and inequality indices are estimated as the impact of land reform policy implementation.

The findings of this analysis suggest that implementation of current ceiling policy will increase average per capita household income by 3.85% and average per capita household consumption by 3.13%. Moreover, there will be substantial increase in per capita household income and consumption in landless and marginal households but only slight decrease in per capita household income and consumption in large households while small and medium households are unaffected by these ceiling policies. Similarly, the overall poverty and inequality will be reduced slightly (about three percentage point) while rural poverty will be decreased substantially but no change in urban poverty. Hence, this analysis successfully answers the first research question that implementation of land reform policy will increase equity and welfare in Nepal.

To answer the second research question using the same household survey, Cobb-Douglas stochastic production function (SPF), data envelopment analysis (DEA) and

inefficiency effects model are used in chapter four to estimate the technical efficiency scores and sources of inefficiency in Nepalese agriculture.

The findings of this analysis suggest that Nepalese farms are operating less than frontier and inefficiency sources are common. The gap between frontier and actual production is 30 percent based on SPF and 32 percent based on DEA showing mean technical efficiency scores vary widely between household land sizes and regions. Estimated results show an overall mean technical efficiency score of 0.70 by SPF methods and 0.68 by DEA methods. Based on these results, sample households could increase about 30 to 32 percent of their output through better use of available resources. Additionally, estimated results reveal that the unused land and fragmented household land are important sources of technical inefficiency. If inefficiency effects were eliminated, we could increase the output keeping the same level of inputs. This can be done only by properly implementing productivity enhancing land reform. Hence, this analysis also successfully answers the second research question that implementation of land reform policy can reduce inefficiency in Nepalese agriculture.

To answer the third research question, IO table and SAM of Nepal for 2010/11 are estimated. Then using the results of micro studies from chapter three and chapter four, the economy-wide impacts of land reform are studied using IO and SAM framework. In chapter five, three simulations are performed. The first simulation is the impact of redistributive reform in Nepalese economy (using results from chapter three), the second simulation is the impact of production augmenting reform (using result from chapter four) and the third simulation is the impact of both reforms simultaneously.

The findings of chapter five suggest that land reform has positive economy-wide impacts. Redistributive land reform increases income level of rural landless and marginal households and reduces inequality. Moreover, there will be substantial increase in income of rural landless and marginal households and slight decrease in income of rural large

households in all regions as the same percentage in chapter three because consumption results from chapter three are used taking these households as exogenous. However, different from chapter three, the income of small and medium households will also increase in this analysis increasing the total production and income in the economy. This is because, in SAM framework, the change in policy in micro level has an economy-wide macro effect, which is the main theme of micro-simulation macro-effects approach. Similar to chapter three, this implementation of redistributive reform will increase equity in the whole economy. Additionally, the IO analysis presented in appendix 5A has also similar but little less impact because SAM framework captures the circular flow of income in an economy, which IO framework does not.

However, productivity augmenting reform has more impacts on Nepalese economy. In this setting, 10% increase in agricultural crop production will increase the production of all sectors of economy including income of all households as the result of multiplier effect in the economy. In the same time, it will keep the inequality level unchanged because this will affect the income of all households in the similar manner. Similar to chapter four, productivity augmenting reform has economy-wide efficiency effects (IO analysis has similar but less impacts in this case too).

Furthermore, implementing both types of reforms (redistributive and productivity augmenting) simultaneously produce huge impact on Nepalese economy by gaining both equity and efficiency together. Therefore, both types of reforms are important in Nepalese case. The former increase equity while the later increases efficiency. Both reform measures using together will not only increase welfare of households and productivity of economy but also increase the possibility of investment in rural infrastructure, commercialization of agriculture and shifting the surplus labor force in the modern sector by opening the doors for transformation of Nepalese economy. Hence, this analysis also successfully answers the third

research question that implementation of land reform policy has substantial positive impacts in Nepalese macro economy.

In order to implement the redistributive land reform, proper identification of rural landless people before redistribution starts is the most. Who are the exact possible beneficiaries of the redistributive reform policy? To know the identity of real landless, the local level communities in their origin can help them to identify properly. Therefore, it is recommend that before starting the implementation process, the concerned authorities need to make good records and database of beyond ceiling household own lands and the beneficiary landless using information from nationwide consolidated databases. These will help in the screening of beyond ceiling lands, false landless, landless recommended by some political parties with their political interest and so on and prevent from adverse selection due to information asymmetry.

Moreover, it is also recommend that land reform should be one shot policy action all over the country and successful implementation is crucial. Furthermore, both redistributive land reform and production augmenting land reform should be implemented together. To control fragmentation of land, transfer of land from father to sons or daughters in inheritance basis should not be free of taxes but with substantial tax to the government. This will help to control the fragmentation of land and make the new generation less dependent on their parents bequeath without their any effort. This will also raise the revenue of the government.

In the course of doing this research, some issues for extension of this research work are identified. Due to the unavailability of household level panel data, the cross section data of Nepal living standard survey 2010/11 is used in this research. In Nepal, three panel studies were already done in household level in 1995/96, 2003/04 and 2010/11. If these data were available, it would be better to use panel analysis for chapters three, four and five. Moreover, an agricultural household acts as both producer and consumer of agricultural products. Using

household level data, we can study the consumption and production behaviors of Nepalese households. Therefore, the estimation of household demand function and household production function for each category of household may be a topic for further research.

Furthermore, in this research, two general equilibrium models are used- SAM model in chapter five and IO model in appendix 5A. SAM based general equilibrium model gives more precise impact assessment of policy alternatives in an economy than input-output model. However, in SAM model, price is assumed constant and exogenous. This type of fixed price model does not capture the substitution effects. In addition, in SAM model, some sectors must be kept exogenous. This has disadvantage of over calculation of change in income, output and other variables. In contrary, computable general equilibrium (CGE) model assumes price as endogenous and captures the substitution effects. Moreover, in CGE model, all sectors are assumed endogenous; labor market is cleared and may give micro-economy consistent effects of policy.

In this research, the results from chapters three and four are used in SAM model in chapter five, which may be good at this point. Using CGE, the consistency of this research may be violated at this situation because SAM and CGE models may give different results due to different assumptions used. However, to overcome the bottlenecks that arise in SAM framework, it is suggested to use computable general equilibrium (CGE) modeling framework to study the impact of alternative policy scenarios of land reform in Nepal, which is also the topic for our further research.

1. Introduction

1.1 Nepal and Nepalese Economy

Nepal is a small country situated at the Southern part of Asia in the Himalayan region. Being sandwiched by two economically growing giants India (in South, East and West) and China (in North), Nepal is a landlocked country. Additionally, Nepal is a strategic point between two opposite ideologically guided large countries and historically symbolized as being analogous to “a yam caught between two boulders”. The county has a tremendous geographic diversity and climatic topography vacillating 70 meters elevation from sea level (Kechana of Jhapa district) to 8,848 meters (the Mount Everest, the top of the world).

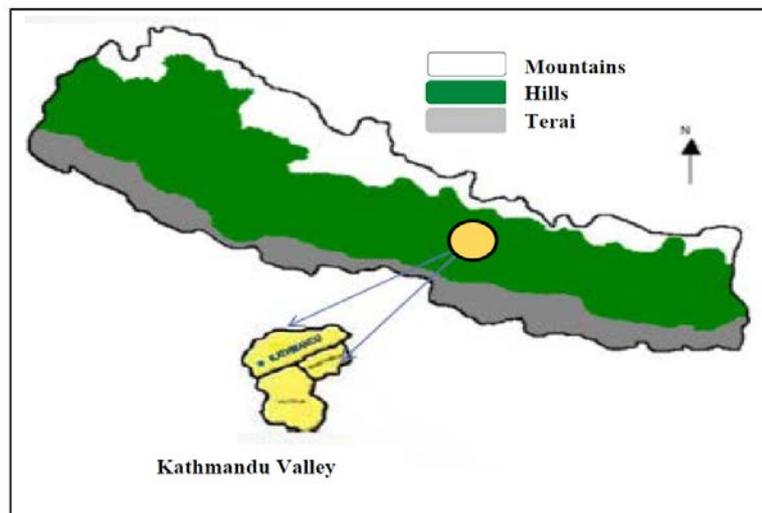


Figure 1. 1: Map of Nepal

The total area is 147,181 square kilometers with average of 800 kilometers length and 150-250 kilometers width with a rectangular shape like an irregular brick (see figure 1.1). The Northern part is Mountains region covering 15% of the total land area and bordering China, the middle part is Hills region covering 68% and the Southern part is the tropical lowland known as Terai region covering 17% of the area which stretches along the

Nepal-India border. Nepal is an agricultural land scarce country because the Mountains region is covered with snow as most of its part lies above snowline (5,000 meter) with high range of mountains of 90 peaks over 7,000 meters height, Hills is affluent with steep slopes and rocks, and in comparison, Terai has much productive land. For the implementation of land reform law, land ceiling provision is based on three regions called Kathmandu Valley, Terai and All Other Regions (Hills and Mountains except Kathmandu Valley of Hills region). Therefore, we mention here about these three regions in detail.

Kathmandu Valley: Among 75 districts of Nepal, Kathmandu Valley covers three districts- Kathmandu, Lalitpur and Bhaktapur. Kathmandu is the capital city of Nepal. Kathmandu Valley is very productive area in terms of agricultural productivity but due to urbanization, most of the areas are the densely populated residential areas. The sub-urban areas far from city centers and some rural areas are still performing agricultural activities. The urban people of cities are either engaged in trade and business activities or employ in government or other private organizations. The rural people of Kathmandu Valley have mainly occupation in government and private institutions or they have side-by-side agricultural activities. Some people produce vegetables and fruits in their land and supply to cities. Similarly, they produce, chicken, milk and other dairy products and supply to cities. In the Kathmandu metropolitan city and other municipalities, people have small plots of lands used either for housing or for housing with small home garden with vegetables. Land fragmentation is very common in these cities. Sub-urban areas and rural areas near these cities have relatively bigger land plots used for peasantry such as rice, potato and green vegetable fields.

Terai: Terai is lowland with plain surface stretched along Nepal-India boarder. Among 75 districts, 20 are in Terai region. They are Jhapa, Morang, Sunsari, Saptari, Siraha, Dhanusha, Mahottari, Sarlahi, Rautahat, Bara, Parsa, Chitawan, Nawanparashi,

Rupandehi, Kapilbastu, Dang, Baitadi, Bardia, Kailali and Kanchanpur. It is a very productive area of Nepal and generally called “grain stockpile of Nepal”. The major occupation of the people in Terai is agriculture. Rice is the main crop cultivated in Terai. Other crops include wheat, pulses, sugarcane, jute, tobacco, maize etc. Irrigation and extension services are relatively more available in this region. Very limited modern equipments such as tractors, threshers are used in this region while in other regions these equipments are not used.

All Other Regions: Among 75 districts, 52 are in this region counting 36 in hills and 16 in mountains. The districts in Hills regions are Ilam, Pachathar, Tehrathum, Dhankuta, Bhojpur, Khotang, Udayapur, Okhadhunga, Ramechhap, Sindhuli, Makawanpur, Dhading, Nuwakot, Kavrepalanchok, Gorkha, Lamjung, Tanahu, Kaski, Syanja, Palpa, Magdi, Baglung, Parbat, Gulmi, Arghakhachi, Pyuthan, Rolpa, Rukum, Salyan, Jajarkot, Surkhet, Dailekh, Achham, Doti, Dadeldhura and Baitadi. Similarly the districts in Mountains region are- Taplejung, Sankhuwasabha, Solukhumbu, Dolakha, Sinndhupalchok, Rasuwa, Manang, Mustang, Dolpa, Jumla, Mugu, Humla, Kalikot, Bajura, Bajhang, and Darchula.

Unified by King Prithvi Narayan Shah (1723-1775) and ruled by his successors of Shah Dynasty for almost 238 years, it became republican country after dethroning the last King of Nepal, King Gyanendra in 28 May 2008. Among 26.50 millions of people, diverse ethnic heritage evolved from *Indo-Aryan, Tibeto-Burman, Mongolian*, etc. and more than 100 languages are spoken in Nepal (Central Bureau of Statistics, 2012).

Nepalese economy is predominantly an agricultural economy (Ministry of Finance, 2013). Agriculture is the main sector of economy contributing 36% of Gross Domestic Product (GDP) and main occupation of 71% of the population. As 25.2% of population is

below absolute poverty¹, reduction of poverty is the main economic goal of the country at present. Low GDP growth (4%), low level of investment (14%), high capital output ratio (4:1), low quality of infrastructure, low literacy rate (72%), wide investment saving gap (5% of GDP), wide government deficit (6% of GDP) and lack of adequate resources are some of the structural bottlenecks in the economy. Majority of human capital is low skilled and a brain drain trend for high skilled human capital is common².

The share of agriculture in economy is decreasing and share of non- agriculture is increasing in recent years (see figure 1.2). The share of agriculture was 51.7% in 1985 but gradually decreasing became 36.4% in 2012. The GDP growth rate seems in irregular trend with maximum of 6.2% in 2000 and minimum of 3.5% in 1995 and 2005. In recent year (2012), it is observed as 4.6%.

Though, Nepal is known as a mountainous country and the birth place of Lord Buddha in general, in the intentional community, Nepal is further known as low income country (LIC) with gross national income (GNI) per capita of \$ 540 in 2011 (World Bank, 2013). Since, three sides from India surround Nepal; the landlocked position has made its economy very dependent upon India to reach the seaport facilities and most of the imports come from India. Agricultural sector is in a subsistence level with mostly traditional technology. Most of the agricultural activities are performed on manual basis. Trading, construction, manufacturing, transportation and communication are the major other sectors contributing Nepalese economy.

The skyline chart of Nepalese economy shows the sectoral share in horizontal axis and self-sufficiency level and imports in vertical axis (see figure 1.3). Overall self-

¹ This figure is based on Nepal living standard survey 2010/11 (Central Bureau of Statistics, 2011a) and the national poverty line is Rupees 19,261.18 of annual per capita consumption.

² These figures are based on economic survey of Nepal 2013 (Ministry of Finance, 2013)

sufficiency of Nepalese economy is 80.4% and rest 19.6% of domestic demand is fulfilled by imports.

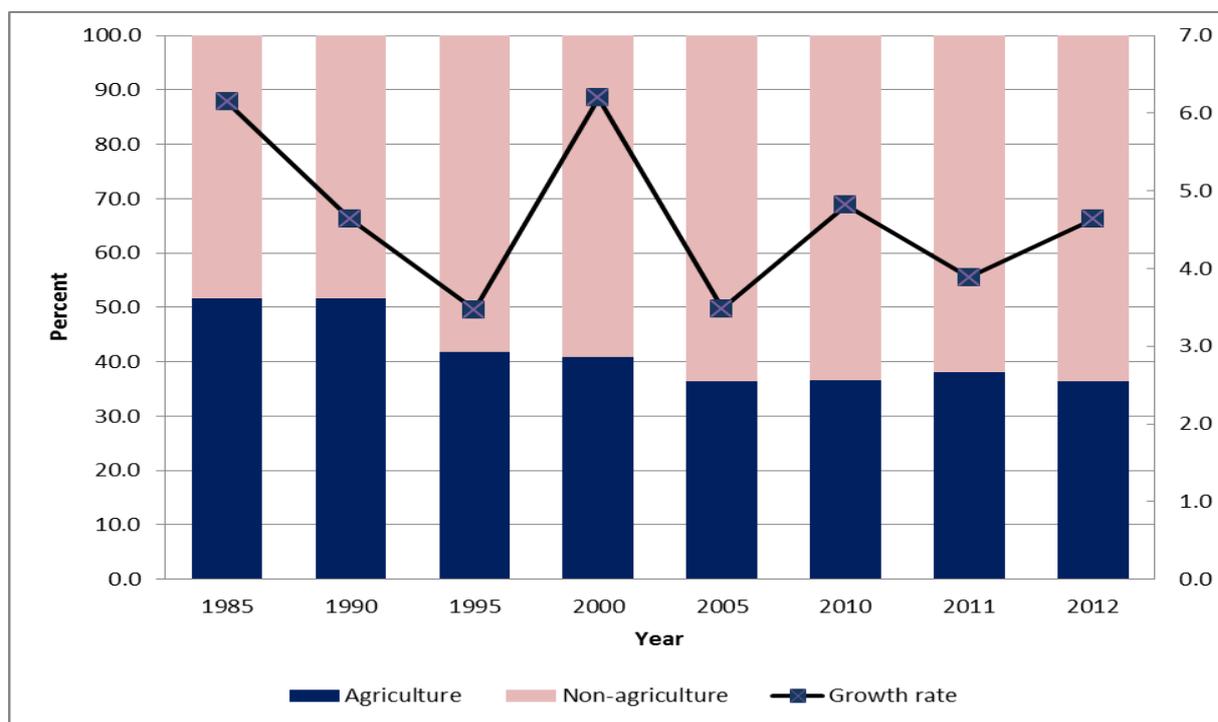


Figure 1. 2: Sectoral Share of GDP and GDP Growth

Note: Left scale- sectoral share, Right scale- GDP growth rate; Source: Economic Survey Fiscal Year 2012/13 (Ministry of Finance, 2013)

Besides, livestock and fishery sector has highest self-sufficiency among others (95.9%) followed by other grains and crops (93.6%), paddy (92.7%), wheat (90.2%), construction (89.2%), forestry (85.8%), other services (84.7%), food processing (77.2%) and mining and quarrying (59.5%). Furthermore, the performance of other manufacturing sector, which includes petroleum-chemical, beverage-tobacco, metal, vehicle and machinery, textile and apparels, etc. is very poor in terms of self-sufficiency (43.2%). Similarly, public utility sector, which includes electricity, gas and water, is only 51% self-sufficient.

From skyline analysis, we see that manufacturing sector is performing very poorly in Nepalese economy while agriculture (paddy, wheat, other grains and crops and livestock and fishery) is better, though none of the sectors is self-sufficient. Since about 20% of domestic demand comes from import, Nepalese economy seems to be import-based

economy. Agricultural growth is necessary to meet the domestic demand and productive use of land can help for agricultural growth.

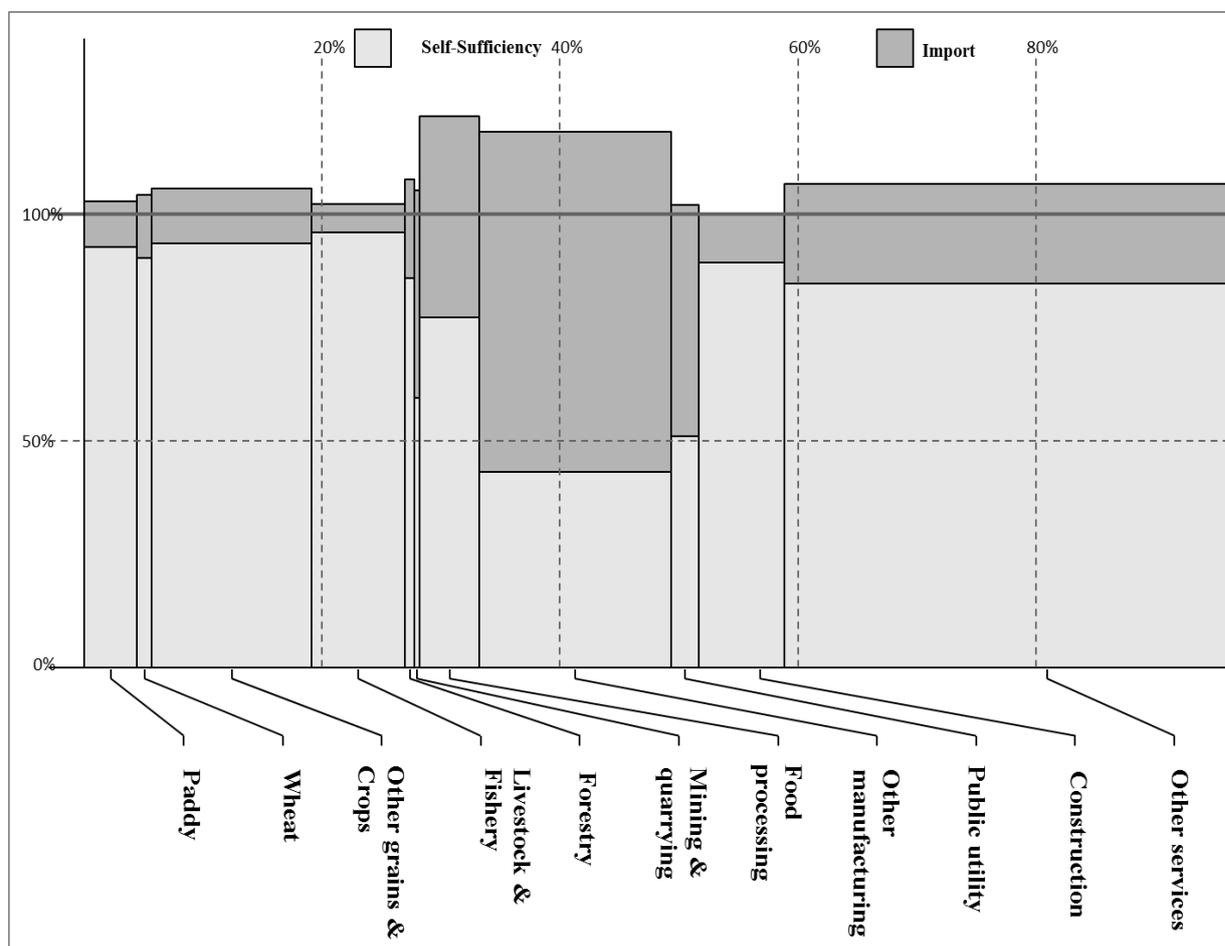


Figure 1. 3: Skyline Chart of Nepalese Economy

Source: Input-Output Table of Nepal 2010/11 Estimated by Author

Table 1.1 shows some of the indicators in Nepalese economy and its comparison with South Asia, Sub-Saharan Africa, the Organization of Economic Co-operation and Development (OECD) countries and the world averages for the last decade (2000-2010). In this period, the GDP growth of Nepal (3.93%) was far below South Asian growth rate (7.10%), below Sub-Saharan Africa (4.88%), and below that of low-income countries (5.32%). Since, the OECD countries are already graduated in economic development; their growth is low (1.55%) and the world average is 2.56%. This comparison reveals that Nepal should accelerate its economic growth to catch up South Asian region.

Table 1. 1: Comparisons of Some of the Indicators of Nepal (2000-2010)

Category	Nepal	South Asia	Sub-Saharan Africa	Low Income Countries	OECD Countries	World
GDP growth rate (%)	3.93	7.10	4.88	5.32	1.55	2.56
Agriculture in GDP (%)	35.88	19.65	16.43	29.35	1.72	3.74
Poverty Incidence \$1.25/day (%)	53.27	37.69	48.81	53.48	-	-
Income Gini Index (%)	42.73	-	-	-	-	-
Agricultural Land (% of total land)	29.71	54.76	44.21	37.62	36.73	37.88
Arable Land (% of total land)	16.43	41.76	8.10	9.13	11.94	10.68
Arable Land Man Ratio (ha/person)	0.09	0.13	0.25	0.19	0.34	0.21
Permanent crop land (% of total land)	0.82	2.81	0.93	0.83	0.79	1.11
Agricultural Employment (% of total)	70.90	52.15	42.54	37.51	5.78	33.84
Cereal Yield (metric ton/hectare)	2.27	2.57	1.21	1.88	4.70	3.33
Rural Population (% of total)	84.76	70.90	65.86	74.12	22.21	50.61

Source: World Development Indicators 2013 (World Bank, 2013)

Share of agriculture is still higher in Nepal (35.88%) in comparison with all. As the economy achieves higher stages of development, the share of agriculture decreases, for example, in OECD countries, it is below 2%. Additionally, in Nepal, agriculture sector is the primary sector and it has less value added than secondary sector (industry) and tertiary sector (services). The share of agriculture is still higher means Nepal needs structural transformation of economy from agricultural to industry and later to services sector. Poverty incidence (\$1.25/day) is 53.27% in Nepal, which is same as low-income countries average (53.48%) but worse than South Asia (37.69%) and Sub-Saharan African average (48.81%). This shows that though at national poverty level, absolute poverty decreased to 25.2% in 2011, the absolute poverty of the decade at international poverty line is higher. This is because of the low living standard of Nepalese people compared to the international

purchasing power. Similarly, income distribution is very unequal as income Gini index is 42.73%.

Nepal has less agricultural land (29.71%) compared to South Asia (54.76%) and other averages. Arable land in Nepal (16.43%) is also far below South Asian regional average (41.76%) but little above than others. Moreover, arable land man ratio is the lowest in Nepal (0.09 hectare/person). This shows that Nepal is land scarce country. Since, creating or increasing land is impossible, we need to concentrate on productive use of it. Land with permanent crop is 0.83% in Nepal which is same as low income countries average but less than South Asian average (2.81%) and world average (1.11%).

In Nepal, among all, 70.90% of people are dependent on agriculture for their employment while it is 52.12% in South Asia, 42.54% in Sub-Saharan Africa, 37.51% in low income countries, 5.78% in OECD countries and 33.84% in world. This shows that dependency on agriculture is highest in Nepal. Nepal's cereal productivity (2.27 metric ton/hectare) is higher than that of Sub-Saharan Africa (1.21 mt/ha) and low income countries (1.88 mt/ha) but lower than average of South Asia (2.57 mt/ha), OECD countries (4.70 mt/ha) and the world average (3.33 mt/ha). This shows that the productivity of cereal needs to increase to meet South Asian level or world level. Compared to others, the rural population of Nepal (84.76%) is higher than others, means urbanization is in low level and the form of poverty is the rural poverty in Nepal. Since, rural economy depends upon subsistence agriculture; land reform may have greater impact on rural poverty.

1.2 Landlessness as a Terrific Problem

According to Badal Commission (2000), the number of landless people in Nepal was around 500,000 in early 1990s. This figure is increasing day by day as the time is passing. Adhikari (2008) states: "Landlessness means a situation, in which a person is dependent on

agriculture but has no land in his/her own name or family member's name" (p.43). He further describes the consequences of landlessness as follows:

Landlessness has several implications for families: lack of citizenship and non-capacity to take part in political affairs and avail of government's services like education, health, and inability to take credit from formal institutions. As a result, the landless are forced to live in public and unsafe places and thus they become vulnerable to natural and manmade disasters. Most of the street children come from these landless families (ibid).

Furthermore, landlessness is a great problem in an economy. Many rural issues revolve around the land assets. How landless people are trapped in a vicious circle and how helpless and miserable they are is shown in figure 1.4. The central variable landlessness is surrounded by many other variables and most of them simultaneously cause and are consequences of landlessness. For example, landlessness is a cause and also a consequence of poverty (Shrestha, 1990). In case the credit market is absent in rural areas; natural disasters, risks and shocks, either they are idiosyncratic or co-variate, make people with small and marginal lands to borrow debt from landlords committing to pay high interest rates putting land as collateral because most of them do not have any other resource to cope the vulnerability situation. Due to deprivation in assets and other facilities, they have nutritional deficit and low productivity. They will further end up with low income and consumption. The cyclic compound interest to be paid to landlords is difficult to pay with their low income. The result is they have to give their valuable assets to the landlords including land. This will make people with marginal land the landless.

The social and cultural customs such as celebration of festivals, marriage ceremony, funeral activities need a lot of money. The demonstration effect in the society motivates poor people with marginal land to borrow loan and enjoy in festivals and also keep

practicing rituals. Peoples with some ethnicity have their own customs of celebration with their community (for example, *Guthi*³). They need to keep their tradition to pay for communal celebration in their turn. In this condition, they borrow a huge loan keeping their land as collateral. If they could not pay loan with their earning, the ultimate effect will fall on land asset making landless. Some bad habits of the head of marginal households such as alcoholic habit, playing cards, etc. also lead them to landlessness.

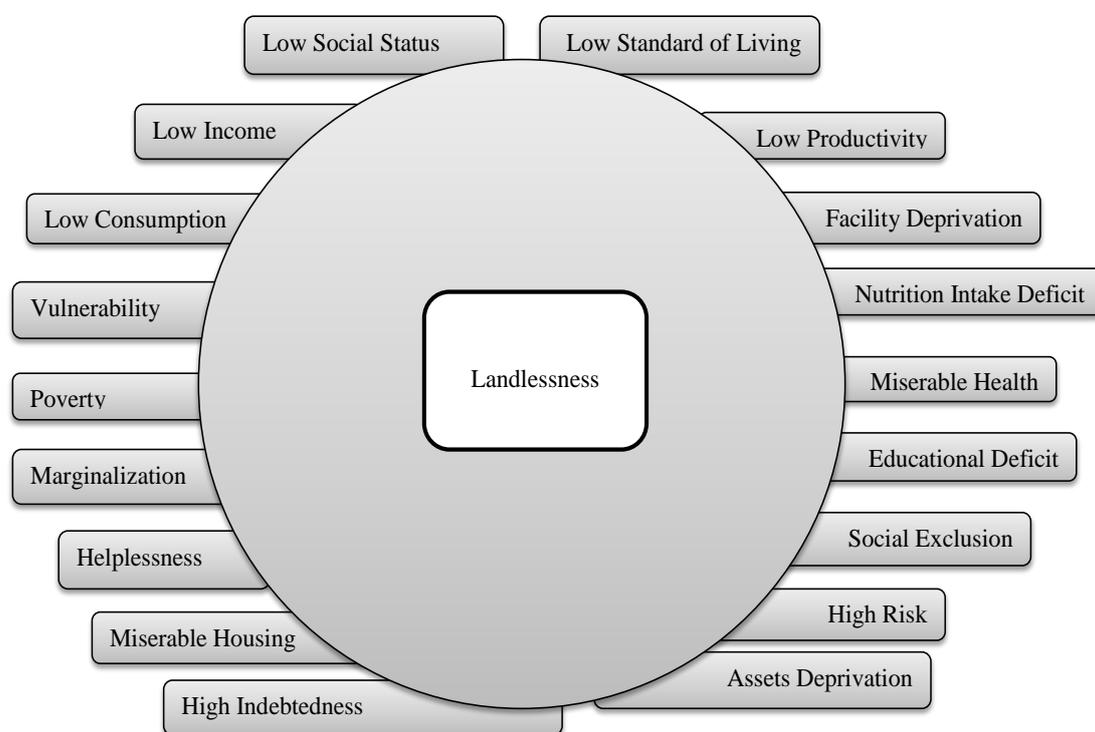


Figure 1. 4: Vicious Circle of Landlessness

Source: Prepared by Author

Moreover, there may be other reasons of landlessness. Considering these causes, Karki (2002) categories the landless people of Nepal into different four categories: victims of natural disasters, internal migrants displaced by socio-economic causes, migrants from

³ *Guthi* is a group of social organization that is used to maintain the social order of some ethnic people (for example *Guthi* of *Newar* community).

India and some of the indigenous peoples of Terai which are the caste discriminated minorities such as *Tharus*, *Mushahars*, *Satars*, etc. and deprived caste from Hills. These landless people were also attached with the landlords in various bonded and semi-bonded relationships and worked as of *Kamaiya*⁴, *Haruwa*⁵ and *Charuwa*⁶ for the landlords in bonded or semi-bonded relationship. The real landless people are the victims from these systems mainly in the Western part of Nepal. They are the historically depressed people in the name of vicious cycle of indebtedness from their ancestors. These are the genuine landless people of Nepal who are demanding land rights. The *Kamaiya* system was abolished but the settlement of these landless people is still not resolved.

Landless people migrate from rural areas with the help of their social networks and settle where other landless are living. As social network (family and friends network) is very important for labor migration in Nepal (Paudel, 2011), the settlement of landless people will increase with the number of other landless in their network. Also, the frontier migration of landless people from Hills and Mountains to Terai region and settling near forest areas encroaching forest land or some public land, is a great problem. We still see this encroachment of public land near river basin and stream side in Kathmandu Valley and other major cities too. In the name of *Sukumbashi*⁷, they make small huts and settle down in different public places. This has not only deteriorate the beauty of city but also created many social problems. This type of landless people need to be further investigated either they are real landless or not.

⁴ *Kamaiya* is a traditional system of bonded labor working for landlords in southern part of Nepal. The people affected by this system are also called *Kamaiya* or *Kamaiyas*. The terms *Kamlari* and *Kamalari* are also being used in the same ways. In 17 July 2000, the Government of Nepal announced the *Kamaiya* system be banned.

⁵ *Haruwa* is a system of hiring ploughman with bonded agreements working free to pay off debts.

⁶ *Charuwa* is a system of hiring a bonded labor taking care of cattle free to pay off debts.

⁷ *Sukumbashi* is a person or household without land ownership. Landless people are often called *sukumbashi* in Nepal.

If the vicious circle continues, more people will become vulnerable of landlessness. According to Shrestha (1990), landlessness and near landlessness will persist for a long time to come and the future of Nepalese agrarian economy depends on what happens to them. He further emphasizes that the socio-economic degradation of these people will further entrench underdevelopment and any progress they achieve will uplift both local and national economies. Additionally, only an individual household cannot break the terrific circle presented in figure 1.4. To come out from this circle, government intervention is needed which can be done by means of proper implementation of land reform policies targeting the real and needy landless people.

1.3 Land Reform Issue Still Alive in Nepal

There has been a huge debate in academics for decades that either land reform is dead or alive. Professor Michael Lipton's book *Land Reform in Developing Countries* (2010) raises some important questions- "Is land reform still alive, for example in Bolivia, South Africa and Nepal? Or it is dead and, if so, is this because it has succeeded, or because it has failed?" In conclusion, Professor Lipton notes: "In many developing countries, land reform is alive, often burning issue, twenty years after the end of cold war. The debate about land reform is alive and well. So is land reform itself. And so they should be" (ibid., p. 322).

Land issues, and more specifically land reform issues are live issues in many developing countries including Nepal and they are more serious now than decades ago because land reform has not come to a logical end and the story of poverty and inequality is much more complex today. Moreover, land reforms in developing countries are often aimed at improving the poor's access to land, although their effectiveness has often been hindered by political constraints on implementation (Besley & Burgess, 2000). Elite's pressure and lack of will power of ruling political parties end up with lack of implementation of current

laws and further no progress to launch new laws. Therefore, the continued failure of land reform has been one of the most contentious issues in the political economy of Nepal for over half-a-century (Bhandari & Linghorn, 2011). Recognizing this issue, a decade long civil war (1996-2006) also ended up with commitments to employ scientific land reform and end any form of feudalism in the country. On the one hand, several high-level land reform suggestion commissions were formed but their study reports rarely implemented, on the other hand, land rights movements of landless farmers are continued and active now demanding land for cultivation and focusing on educating, empowering and mobilizing landless farmers to claim their rights and give pressure for inclusive policy-making and a reformed land administration (Community Self Reliance Center, 2009).

Nepal needs to refocus on agricultural growth as the engine to reduce rural poverty by accessing of poor to land resource, which may ensure the benefits of agricultural technical change for many poor living under the absolute poverty line. Since, there is a huge inequality in land distribution⁸, landless tenants are demanding land rights and more importantly still huge efficiency gaps in production (Adhikari & Bjorndal, 2012), indicates unquestionably that land reform is alive in Nepal. Expressing the following view; Wily, Chapagain & Sharma (2008) also support this hypothesis that the land reform is not completed and still active in Nepal:

Although overlord powers of landlords and colonizing agents have been successfully diminished, other destructive characteristics of feudal land relations continue to flourish. These include high levels of absentee landlordism, large areas of underutilized farmland, and failure to reform the conditions of those who farm others' land, some

⁸ According to Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a), Gini Concentration Index is 0.57

of whom, extraordinarily, remain in debt peonage until today and despite repeated legislation against this (p. iv).

Due to the uneven allocation of land and its low productivity, to continue farming has become much repulsive to many farming populations for their livelihood. The most productive land in the hands of most unproductive landlords and many barriers in farming practice hindering the investment in agriculture, commercialization and the agricultural output growth (Adhikari & Bjorndal, 2009).

Data show that 3% households have more than 17% land and 27% of households are landless and near landless⁹ having only 5% land ownership (Central Bureau of Statistics, 2011a). This demonstrates that the distribution of land is skewed. The landless do not have land for cultivation whereas some of the land with large landlords is left fallow. The visible inequality in land distribution is one of the causes of low productivity in Nepal because those who have farming skills do not have enough land and those who have land do not have farming skill or no necessity of farming (Adhikari & Bjorndal, 2012). This kind of adverse situation in land is causing a vocal demand of land reform among the stakeholders.

1.4 Motivation

Farm households are the fundamental units of economic organization in most of the developing countries including Nepal. Land is still the primary means of production for most households in rural Nepal. A household or a holding unit acts both as producer and as consumer. A household's decision about consumption and production depends on many factors including household income and availability of production inputs. In conventional economic system, land, labor and capital are the main inputs used in production. The appropriate use of these inputs can increase the production in an economy. Among inputs,

⁹ Near landless means those households that have marginal land insufficient for meeting their consumption need.

land is the main input used in agricultural production. Proper use of land input by productive farmers can change the structure of economy by accelerating economic development. Assets distribution policies, like land reform, is a measure that can be used as an instrument for achieving social equity, economic efficiency and growth of economy (Bardhan, 1996).

The suppression of landless and tenants by landlords caused the landless and tenants movements in many periods of times (for example, *Jhapa* land rights struggle 1970-74, *Dhankuta* movement 1979, *Piskar* movement 1983, *Kamaiya* movement 1998-2000, and currently land rights movement by land concern groups, etc.). The unsafe settlement of landless people encroaching public places and disaster risky places is a great problem in the country. About one third of the country's population being landless and near landless is a huge hindrance for development. Landless people are also the citizen of the country. Without addressing their issues properly, the country cannot go ahead for progress and prosperity.

Moreover, land issues are also the main cause of social unrest in Nepal. Many studies (for example Regmi, 1977, Shrestha, 1990, Adhikari, 2008, Uprety, Sharma & Basnet, 2009) mention that many social unrests in Nepal have their root on land. Recognizing this issue as major developmental issue of Nepal, *The Interim Constitution of Nepal 2007*, under the clause of responsibilities, directive principles and policies of the state, mentions that the state shall have the responsibility: "To pursue a policy of adopting scientific land reform programs by gradually ending feudalistic land ownership" (Government of Nepal, 2007, p. 16). Additionally, the political parties have always sighted land issues as a key political agenda; they always failed to identify real landless people and could not address this issue properly. In this context, Adhikari (2008) remarks:

Landlessness has been attracting the attention of governments and political parties, especially after 1990. When in power, they form Landless Problems Settlement Commissions with the purpose of distributing lands to the landless. But these commissions either distribute land to their cadres or to fake landless people, who become landless to get the government land. Therefore, not much progress has been seen in this regard. The number of landless people is increasing despite distribution of land from time to time (p. 45).

Besides, many commissions were made for land reform. For example, Badal commission in 1996, high-level land reform commission in 2008, high-level scientific land reform commission in 2009. These commissions presented their reports to the government and gave suggestions for land reform in favor of landless people. The major suggestions were reduction of ceiling especially in Terai region, distribution of beyond ceiling land, tenancy reform and modernization of agriculture. However, the government failed to implement these suggestions.

Land Reform Commissions were criticized on the ground that they were formed only to recruit respective political parties' cadres, only concentrating on their vested interests and distribute public land to their voters in the name of fake landless but the problems worsen as the time passed. However, suggestions were good in paper; they were rarely implemented in reality. The government never implemented land reform laws in order to redistribute the beyond ceiling private land of large landlords to real landless poor (Wily et al, 2008, Community Self Reliance Center, 2009, Adhikari, 2008).

Therefore, in Nepal, the problem in land reform is the proper implementation of land reform policy. What would happen if the policies were implemented properly is the main concern. Furthermore, it is often said that proper implementation of land reform can be used

as means of reducing social conflicts, increase social welfare and maintain the economic status of poor households if implemented timely and properly. Moreover, this issue is a hot issue at present and needs to be addressed urgently. Without solving land reform issue appropriately, agricultural development and transformation of economy is almost impossible.

Needless to say, evaluation of possible implementation of policy is very important because it will give clear picture to the policy makers about the impact of policy. Empirical study about impact of implementation of land reform policy on equity, efficiency and macro-economy not only gives good information for future policies but also suggests the policy makers that which policy options have more benefits to achieve these goals. Consequently, evaluation of the impact of implementation of land reform policy on equity, efficiency and macro-economy of Nepal from micro as well as macro perspectives and comparing these may have great significance. Keeping these in mind, the central motivation in this research is to evaluate the impact of implementation of current land reform policies in Nepal using micro-simulation and macro-effect approach.

1.5 Research Questions

To address the motivation of this study, the following are the main research questions. Moreover, this research revolves around these questions and tries to explore the possible answers.

1. Does implementation of land reform policy increase household equity and welfare in Nepal?
2. How can land reform policy implementation reduce inefficiency in Nepalese agriculture?

3. What is the impact of implementation of land reform policy in Nepalese macro economy?

1.6 Objectives

Keeping in mind the above-mentioned motivation and research questions, the following are the main objectives of this research.

1. To identify the determinants of household welfare (income and consumption), analyze them and to see the effect of change in land size (by redistribution policy) on household welfare.
2. To identify the efficiency gap between potential maximum output and observed output and analyze the sources of technical inefficiencies in Nepalese agriculture.
3. To find the impact of land reform on different sectors of Nepalese macro-economy using economy-wide general equilibrium frameworks.

1.7 Hypotheses

To justify the motivation, research questions and objectives, the following hypotheses are set. These hypotheses are tested by using different data and models and explained using estimation results.

- a. Land reform implementation increases household equity and welfare and reduces poverty and inequalities.
- b. Reforming land increases technical efficiency of farmers.
- c. Land reform has significant positive impact on Nepalese macro-economy.

1.8 Analytical Framework

To address the research questions, research objectives and hypotheses of this study an analytical framework is used which is presented in figure 1.5. This framework captures all the concepts and models used in this research. The variables included inside the pointed tip rectangles are the exogenous variables used in this study. The variables in the rounded tip rectangles are endogenous variables and land reform in circle is the process, which transfers the impact of change in exogenous variables on endogenous variables. Additionally, land reform is a policy decision by the government. However, land reform is a complex process and many factors can affect it, for simplicity; land reform is taken as exogenous in this framework.

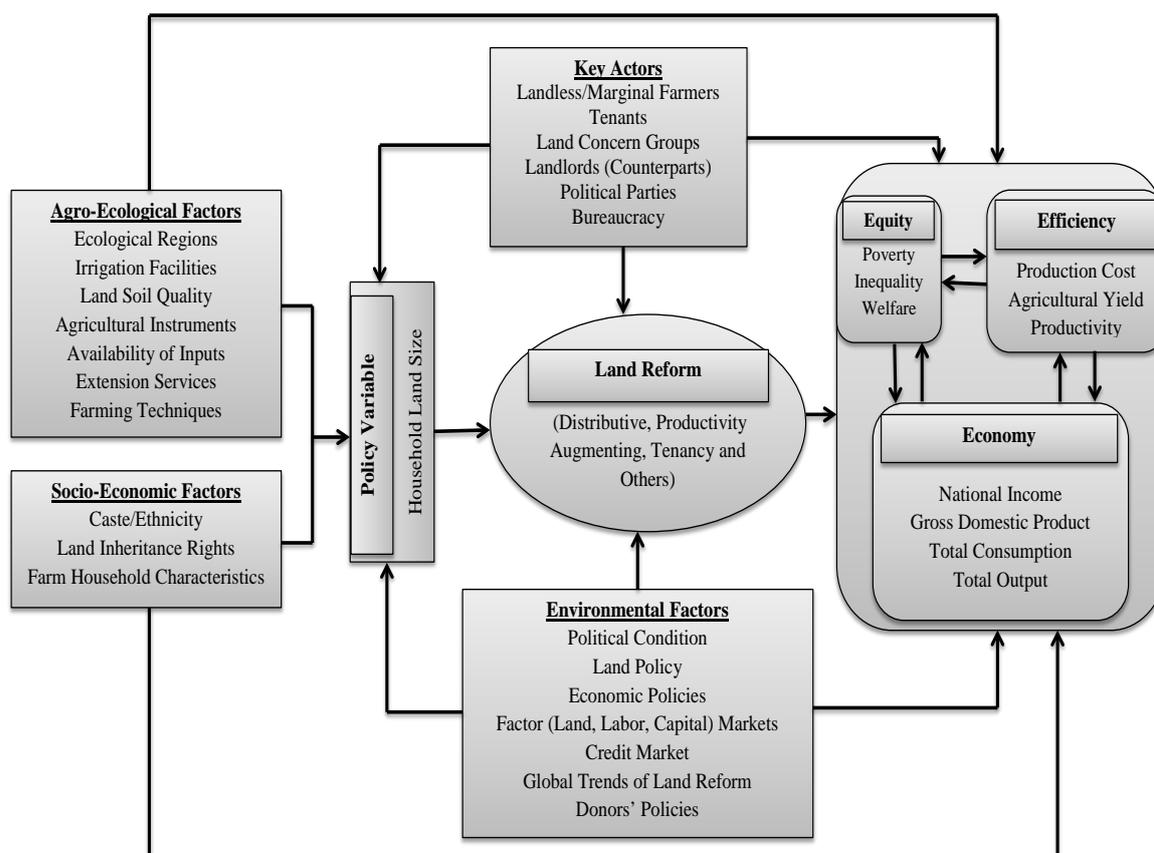


Figure 1. 5: Analytical Framework

Source: Prepared by Author

The major policy variable is household land size. Land size decides the status of each household in terms of land ownership. Depending upon land ownership, households are grouped as landless with no owned land, marginal (near landless) with marginal land, small, medium and large based on the land category defined. Though land is stock at a time, it is an important resource and factor of production that can influence many other variables. Moreover, it is expected that the changes in the ownership pattern of household land greatly affect the endogenous variables such as equity (welfare – income or consumption, poverty, inequality, etc.), efficiency (production cost, agricultural yield, productivity, etc.) in micro-level and the whole economy (national income, gross domestic product, total consumption, total output, etc.) in macro level.

The impacts of change in household land size due to the implementation of land reform together with other exogenous variables viz- agro-ecological factors (ecological regions, irrigation facilities, land soil quality, use of agricultural instruments, availability of inputs, availability of extension services and farming techniques, etc.), socio-economic factors (caste/ethnicity, land inheritance rights, farm household characteristics, etc.), key actors (landless/marginal farmers, tenants, land concern groups, landlords, political parties, bureaucracy, etc.) and environmental factors (political condition, land policy, economic policies, factor markets, credit market, global trends of land reform, donor policies, etc.) are analyzed using welfare functions, poverty analysis, inequality analysis, stochastic production frontier function, data envelopment analysis, etc. for the purpose of examining the impact on equity and efficiency in micro-level. Additionally, general equilibrium models (input-output model and social accounting matrix model) are used to investigate the impact of land reform on the whole economy.

Throughout this dissertation, the term land reform is used to mean two basic concepts. The one is transfer of land from the households that have large sized land (beyond

the permitted ceiling) to landless and marginal farmers. This type of land reform is known as redistributive land reform. Another is consolidation of fragmented land and utilization of unused land, which could increase efficiency, and productivity of farmers. This type of land reform is known as productivity augmenting land reform. Moreover, the analysis used is static analysis and the dynamic mechanisms such as change in land and labor markets, change in allocation of factors of production and change in social structures as the result of land reform are not considered in this research.

1.9 Organization of the Study

Chapter one of this dissertation is an introductory chapter that introduces brief about Nepal and Nepalese economy, landlessness and land reform issues in Nepal, and includes motivation, research questions, objectives, hypotheses, analytical framework and organization of chapters. Chapter two is the review of theory, policies and literatures. It also includes analysis of land reform success stories, failure and causes, Nepal's experiences on land reform, current policies and current situations of different land related issues in Nepal, the role of key agents and empirical literatures, etc. Chapter three is equity approach of land reform, land reform and welfare change (income or consumption), impact of land reform on poverty or inequality, etc. Chapter four is the efficiency approach of land reform. This further includes technical efficiency, land fragmentation and Simpson index, sources of inefficiencies, etc. Chapter five is the general equilibrium analysis and includes social accounting matrix multiplier approach and evaluation of impact of land reform on different aspects of economy followed by input-output approach of land reform in appendix. Finally, conclusions, policy implications and future suggestions are presented in Chapter six followed by references used in this study.

2. Theories, Experiences, and Literatures

2.1 Context and Definition

Land is a resource provided by nature. We can neither create nor destroy land but can change land management system, productivity and form of land with human activities. Land includes the sub soil of the earth, forest areas, fertile land, pastures, and water resources. Agricultural land includes the part of land, which is used for performing agricultural activities. Arable land, cultivated land, land under permanent and temporary crops, pastures include agricultural land. As one of the factors of production, rent is the return to land if it is used in productive activity.

Increase in population is the pressure on land to use it in a productive way. Growing population in developing world needs more foods for feeding people and this exerts additional pressure on land and environment. From hunting, gathering age to agricultural age, the role of agriculture has changed a little but from agricultural age to modern economic age, agriculture has a major structural shift. It is a source of nutrients, provider of employment to rural people, basis for livelihood for rural poor and supplier of fresh vegetables and fruits to the urban dwellers and also the protector of natural beauty and ecology of a country. Moreover, agriculture conserves diversity of landscapes and ecosystem maintaining animal-nature relationship in the mother earth.

Land reform and agrarian reform are the words used to convey the same meaning but sometimes the later is used in broader sense. Land reform may have different meanings according to its context. One of them may be reforming physical land by means of destroying forest or pasture areas and making arable land. In this study, land reform does not mean to say such things rather means to say the land management and ownership rights.

In this context, there is no any unique definition about land reform. Many scholars have different views. Some of the more convincing definitions are as follows:

According to Doner (1972), land reform is invariably a more or less direct, publicly controlled change in the existing of land ownerships and it normally attempts a diffusion of wealth, income or productive capacity throughout the society. Similarly, another definition states: “Land reform is an institutional innovation promoted by the ruling order in an attempt to overcome economic or political contradictions without changing the dominant social relations...” (de Janvry 1981, pp. 384-5).

Eastwood, Lipton & Newell (2010) define: “Land reform means legislated interventions in farm size, tenure, or transfer conditions designed to change farm size distribution. The stated motive of most land reform is more equitable distribution of owned landholding...” (p. 3355). Arguments for land reform primarily center on its social and political objectives such as improving distributive equity and reducing the concentration of economic and political power in the hands of large landowners (Nguyen & Saldivar, 1979).

Why land reform is needed? Wily et al (2008) argue that land reform aims to maintain social justice, civil peace, cost effectiveness, anti-poverty motives, and most importantly to accelerate capitalist growth by transferring tillers into owners and landlords into capitalists by enforcing them and their capital to be used into new off-farm enterprises.

These definitions are convincing definitions under non-communist setting. Under communist setting, these may not be applied and land reform has detour meaning. Land reform was the collectivization of private land in the state or community control in the early phases and de-collectivization of such collected lands in recent time (Lipton, 2010). In all settings, the common characteristics of land reform are the initiatives of the

government or authorities to change the ownership pattern of land by changing laws, regulations and policies with the aim of increasing agricultural productivity.

Moreover, in this study, the theme of the above-mentioned definitions is taken and elaborated that land reform is a legislative action applied by concerned authority of a country, which aims at promoting social equity; economic efficiency and can have economy-wide effects. There may be winners and losers in the short run but all the people will get benefit in the long run as they use land in a productive way but the rich landlords find agriculture is not beneficial for them and they will invest their money in industrial sectors and create employment. This will gradually transform the economy from agricultural economy to the modern one.

2.2 Types of Land Reform

There are many types of land reform applied in different political situations in different countries. Most common land reforms are: distributive reform or ceiling reform, tenancy reform, collectivization, de-collectivization, and market based reform, etc.

Distributive land reform is also known as classic reform or ceiling reform. In this reform, land is transferred from large farms to small farms. The main aim of this reform is, by transforming land rights to landless or poor households, to raise their status, power and income. In this type of reform, the state declares ceiling of land by legislative procedure, provides partial or no compensation to the land losers, distribute it to identify landless with partial or no payment. This is the main type of state led reform. In tenancy reform, the laws are reformed so that the tenants' rights are secured by registering the records of tenants. Rent is regulated; conditions for tenancy are fixed, the monopoly power of landlord to coercion is made limited.

Collectivization is also called collective farming, state farming or induced joint farming or co-operative farming. This was done in socialist countries around 1960-70. The farmland was transferred from individual owner to groups representing the collectivity. Groups or collectives share costs, farm together and divide the benefit. Entry to this type of farming was mandatory by state laws. There was such type of farming in former USSR in 1930-40s, China in 1950-60s. Similarly Vietnam, Mexico, North Korea, Cuba also adopted this type of farming. Moreover, de-collectivization is the reversion from farm collectivism. De-collectivization is the privatization or liberalization of state forced collective farms to private companies, individuals or households. The countries that had collective farming system adopted this system of land reform from 1970-2000. USSR, China, Vietnam, the East European countries, Mexico adopted this strategy of reform.

Market based reform is also called new wave land reform. Land consolidation, settlement schemes, land tax reforms, progressive taxes are the forms of market based land reforms. This method of land reform involves decentralization of land administration, market driven reform to transfer land rights to poor. This is an alternative to classic reform proposed by neo-classical economists, especially the economists of World Bank. The timeline and paradigm shift in land reform are shown in table 2.1.

The summary of types of land reform and their timeline and paradigm shift are presented in table 2.1. Until 1970, there were mostly two types of reform and their paradigm was land to tillers. Inter-class transfer of land rights from landlords to tenants was implemented successfully in Japan, South Korea, and Taiwan while it was partially successful in some states of India. In the same time, collectivization of private farms into state owned farm was successfully done under communist setting in former USSR and East European countries, China, Vietnam, and Cuba, etc. Locally owned collectives were formed in other countries- Honduras, Mexico and El Salvador, etc.

Table 2. 1: Timeline and Paradigm Shift in Land Reform

S.N.	Timeline	Paradigm	Description	Implemented
1	Until 1970	Land to the tillers	Redistributive Reform, inter-class transfer of land (non-communist reforms) Collectivization to state owned farms, (guided by communist philosophy) Locally owned collectives (other countries)	Japan, Korea, Taiwan, India(some states) USSR, Former East European Countries, China, Vietnam, Cuba Honduras, Mexico, El Salvador
2	1970-1980	Reform in Land Administration	Donor-driven reforms	Usually in non-feudal economies
3	1980-1990	Back tracking on distributive reforms	De-collectivization	China, Vietnam, former USSR, Mexico, Peru etc.
4	2000-till date	Revitalized Reformism	Land tenure reform, progressive land taxation, taxing idle land, market led reforms, community based reforms	Results still to see

Source: Prepared by Author Based on Wily et al (2008), Lipton (2010)

Donor driven paradigm was a reform in land administration in 1970-1980 in non-feudal economies. In the decade of 1980-1990, de-collectivization of collectivized farms were done in the countries under communist setting while from 2000 onwards revitalized reformism in the name of tenure reform, land tax reform, market led reform and community based reform is still continue but the results of these reforms are still to see.

2.3 World Experiences

Unequal distribution of land is one of the most convincing causes for demand of land reform. Large plots of land are still in the hands of limited elite and large share of poor people do not have land in most of the developing countries. As most of the poor of the world live in rural areas and depend on agriculture for their livelihood, agricultural land reform has direct impact on poverty reduction. Additionally, land reform could make a major contribution to reducing both poverty by raising average income and efficiency as the result of redistributive reform (Griffin, Khan & Ickowitz, 2002). For the purpose of

making more equitable distribution of assets and wealth and to bring visible change in the society, inequality in land distribution was reduced in various countries in different times span at the process of their development. To address the issue of landlessness and rural poverty, political requirements and social change, many countries around the world have implemented land reform over the past century (Sobhan, 1993). There are many success stories of land reform as well as failure cases.

What were the past models of reform? Why were some successful and others were failed? Where they got success and where they got failed? What lesson can be learnt for future? These are some questions which are helpful to review the past world experiences of land reform. By reviewing the global experiences of land reform, we can identify the challenges, constrains, and compare the successes (Wily et al, 2008). Therefore, the relevant literatures are reviewed in detail.

2.3.1 Success Stories

The countries such as Japan, South Korea, and Taiwan have success stories in land reform. Cases where the land reform were successful, their economy was transformed into the modern economy and there was a structural change with less share of agriculture and more share of modern sectors in the economy.

Japan has the most successful experience of land reform just after World War II. General McArthur, the supreme commander for the allied powers (SCAP), was the main responsible person who ordered for land reform in Japan in 1945 but the land reform idea itself was a Japanese idea, rather than one imposed by the conqueror (Ladejinsky, 1960). It was a drastic reform and has been considered as one of the most successful land reforms in the history of land reform in the world (Kawagoe, 1999). It was a complete reform as the landlords who dominated the rural society in prewar Japan disappeared as the result of reform.

The major characteristics of Japanese land reform as mentioned in Ladejinsky (1960), Kawagoe (1999) and Quizon (2005) are as follows: (i) Land reform was a great success in terms of political motivation which adequately achieved its political objective (land to the tillers) and thus a drastic reform by which both tenant farmers and landlords disappeared by making the rural community members as owner farmers. (ii) Reform brought more equal assets and income distributions among the members of rural society and contributed to the democratization and social and political stability of postwar Japan. (iii) The landlords lost their economic and political supremacy and the rural society was restructured and a class structure based on land holding status was completely abolished. (iv) The rural population became the most supporters of ruling conservative party throughout postwar period and in this sense, the political motive of land reform was successful. (v) Presence of the supremacy of SCAP was a critical necessary condition for reform but not the sufficient condition, the sufficient pre-conditions were: accurate information and records on land ownership after the land tax revision in the nineteenth century, the tight social structure of Japanese rural villages enabled to identify tenancy relations, many specialists and educated people were available in central as well as in local level to tackle the issues properly.

Furthermore, Japanese reform program imposed ceiling of three hectares (12 hectares in Hokkaido) on land holdings and the landlords were compensated in cash and development bonds. Moreover, the actual tillers were given full ownership rights. As the result of reform, the labor productivity increased annually by five per cent and land productivity by four per cent in between 1954 and 1968 (Quizon, 2005). Japanese land reform was inter-class redistribution of land from large holders to small holders or from landlords to tenants or from elite to workers. In Japanese case, proper information of land records, skilled manpower in land administration, strong administrator in the central level,

proper timing (after World War II) of reform, homogeneity of Japanese society and one shot policy action are the main causes of success. According to Quizon (ibid), the key factors for the success of the reform were an existing well-developed extension service, land records and an efficient bureaucracy.

American Military Government started land reform in South Korea in 1948. Later on, it was continued until 1952 by government of Korea. In this reform, the restriction of upper ceiling of landownership was three hectares. About 52% of total cultivated land was realized in the process of land reform (Ban, Moon & Parkins, 1980). South Korean land reform is also considered successful land reform because it also effectively transferred the land to the farmers who till the land. The major cause for the success of South Korean land reform has been considered as the thorough development and support to local village government to assume the land administration function.

According to (Quizon, 2005), 65% of the agricultural land was redistributed in South Korean reform with setting a ceiling of three hectares of good cropland and land in excess of this ceiling was distributed in units of one hectare to former tenants. This low ceiling policy resulted 76 per cent of the total agricultural households to own land for the first time. Besides social justice of the reform, agriculture achieved growth rate of almost four percent.

The Nationalist Government in Taiwan imposed the land reform program in 1949, which had just been exiled from the mainland. The new government thus had no ties, nor any obligation toward the local landlords. Accurate land tenure records and a non-indigenous bureaucracy were crucial for implementation of reform. Similar to Japan, ceilings were fixed at three hectares. The compensation to landlords was provided in industrial bonds, which they invested in the urban-industrial zone. Between 1953 and 1960, the annual production and consumption of inputs was of 23 percent and 11 percent,

respectively (Quizon, 2005).

Reductions in farm rents, selling arable public land to tenants and land to the tiller are the major steps of land reform program of Taiwan, which was started in 1949. In this process, a low upper ceiling of ownership was imposed with the abolishment of absentee landlordism. Fei, Ranis & Kuo (1979) argue that the proportion of tenant farmers in farm families fell 15 percent and the proportion of land cultivated by tenants fell from 14 percent from 1948 to 1960. Taiwanese land reform is also considered as successful.

The West Bengal case of land reform called “operation bargha” is considered a partially successful land reform in India. In this reform, the tenancy right was secured by legally registering the tenancy right (Deininger, Jin & Nagarajan, 2009; Bardhan & Mookherjee, 2010; Banerjee, Gertler & Ghatak 2002). Similarly, Kerala is also considered as partially successful example of land reform in India while other states failed to implement it properly. Kenya and Chile are also considered as partial success in land reform after decolonization (Hoogeveen & Kinsey, 2001; Leach, 1998).

Additionally, China and Vietnam are successful example of land reform in communist setting (Rozelle & Swinnen, 2004) but they decollectivized the collected farms and leased to private companies in long-term basis.

2.3.2 Causes of Failure

Many developing nations in Asia, Latin America, Africa and the Middle East appear to have failed to improve the lives of the rural poor and their communities to any significant degree through land reform initiatives. Due to the frequent failure of land reform interventions to improve land productivity and reduce poverty of peasants households is possibly one of the reasons why land reform topic dropped off the official development agenda in many countries in 1980s and in recent years, concerns about land

reform have again come to occupy one of the major agendas in the official international development policy arena (Borras, Kay & Akram-Lodhi, 2007).

Many developing countries such as Philippines, Sri Lanka, India, Nepal, etc. of Asia, Ethiopia, South Africa, Namibia, etc. of Africa and Bolivia, Guatemala, Brazil, etc. from Latin America are failed in Land reform. These failures are either lack of implementation of policy or lack of making of good land reform policy. However, land reform issues are still alive and getting more concern today. Cases where land reform became failure, the causes of failure are studied below.

According to Quizon (2005), the Governments in Bangladesh, India and Nepal have formulated various land legislations since the 1950s to the 1990s with some common patterns. They included: greater tenurial rights to sharecroppers, regulating sharecropping and tenancy arrangements; establishing minimum wage for agricultural labor and *benami* (proxy) transactions; abolition of the *Jimidari* (landlordism) system, which operated through multiple layers of rent-seeking intermediaries between the *Jimidars* (landlords) and the actual cultivators; redistributing state-controlled lands; and imposing ceilings on land ownership and then distributing the surplus lands among the landless and poor households. However, in overall, land reforms have had limited impact in South Asia.

As mentioned above, the countries that had complete success in land reform implemented land reform as one shot policy action and it was implemented in proper time. Land reform is more political in nature and needs a strong ruling power favoring it. Considering the success example in mind the following can be mentioned as the causes of failure.

- Weak leadership and unstable government cannot implement land reform policy. Strong political leadership is the necessary condition but not sufficient. The authority should act impartially and no one should be given excuse. If the ruling leader or ruling

class had some kind of vested interest, there would always be possibility of failure of land reform. For example, in Marcos tenure in the Philippines, land reform was started but the rulers had their own vested interest on land.

- A weak land record is another cause of failure. Proper land records, up to date land registration information help to make better policies and action plans for implementation. Local communities can be helpful to update the records.
- Shortsightedness in policy causes failure. Long-term benefit of reform should be included in the reform plan. This may include resettlement of landless, agricultural credit provisions, compensation provisions, supply of access agricultural labor in industry, etc.
- Land reform should be one shot reform policy action not continuous forever in terms of distributive reform. It should be implemented at the same time in the whole country like in Japan, Korea and Taiwan. In other countries where land reform failed, land reform is considered as gradual process, which never ends.
- Lack of human resource causes failure. Skilled and expert land administration can implement land reform in a better way.
- The land ceilings were set too high (for example, among the highest was 19 hectares per household in the Terai region of Nepal, when the average farm size was less than one hectare); and heavy influence of the landowning elite in state administrations, and their ability to maintain a strong patron-client relationship at local level (Quizon, 2005).

2.4 Nepal's Experience on Land Reform

Nepal is a land scarce country. The Northern part (Mountains) is covered by snow with high range mountains, middle part (Hills) has been affluent with steep slopes and in comparison only the Southern part (Terai) has much productive land. To meet the need of

growing population, the agricultural land needs to be managed in a productive way. The government of Nepal has made land reform laws aiming to improve land productivity and to keep the security of peasants and implemented them. Under this section, the reviewed issues in the context of Nepal are: land tenure system, history of land reform, land administration and land laws, current ceiling policies, household land size, family structure and household income sources, land endowment and land input, ownership and operational distribution, land rental arrangements, land market situation, the situation after the five decades of comprehensive land reform law and role of key actors and so on.

2.4.1 Land Tenure System

Traditionally, land has been considered as the property of the state in Nepal. According to Regmi (1997), the system of state owned landlordism is called as *Raikar*¹. This land was cultivated by private individuals but without the rights of alienation through sale, mortgage or bequest. The state used to grant *Raikar* lands both wasted and cultivated to individuals as well as to religious and charitable institutions under freehold tenure. The state also sold *Raikar* lands to individuals. These practices gradually reinforce the theory of state ownership of land in Nepal. By governmental initiatives, the private rights in the lands started to emerge. This resulted in the creation of a number of secondary forms of land tenure in Nepal.

Equally, the derivatives of *Raikar* tenure, *Birta*², *Guthi*³, *Jagir*⁴ and *Rakam*⁵ tenure emerged gradually. *Birta* was the land grants provided by the state to the individuals in

¹ Lands on which taxes are collected from landowners, traditionally these lands were state owned land but in 1964 recognized as private property

² Land grants made by the state to individuals on an inheritable and a tax-exempt basis

³ A land endowment made for a religious or philanthropic purpose

⁴ Land assigned to government employs in lieu of salaries

⁵ Unpaid and compulsory labor services to the government

order to support them with a livelihood. *Birta* was regarded as the private property with clearly defined property rights. Similarly, *Guthi* was the land rights given to the religious and charitable institutions such as temples, monasteries, schools, hospitals, orphanages and poorhouses. Thus, *Guthi* is a form of institutional land ownership.

Table 2. 2: Area under Various Forms of Land Tenure Before 1951

Type of Tenure	Area Cultivated (hectares)	Percent of total land
<i>Raikar</i> (private rights on state land)	963,500	50.00
<i>Birta</i> (private rights on granted land)	700,000	36.30
<i>Guthi</i> (religious land)	40,000	2.00
<i>Kipat</i> (communal tenure by indigenous communities)	77,000	4.00
<i>Jagir, Jimidar/Talukdar, Ukhada & Rakam</i> (subordinate arrangement under <i>Raikar</i>)	1,46,500	7.70
Total area of cultivated land	19,27,000	100.00

Source: Landownership in Nepal (Regmi, 1977), Land Reform in Nepal (Wily et al, 2008)

Before 1951, it was common practice in Nepal to assign the income of *Raikar* land as emoluments of office to government employees and functionaries. Such arrangements were known as *Jagir*. Another form of tenure is known as *Rakam* which refers to those particular category of land grants and assignments to *Raikar* land on which the cultivators were required to provide unpaid labor on a compulsory basis to meet the governmental requirements. *Rakam* tenure thus imposed obligations on the peasants in the form of both in-kind or cash payments and labor services. Other tenures in this group were *Jimidar*⁶/*Talukdar*⁷ and *Ukhada*⁸ etc. These were the sub-division of ownership arising from the *Jimidari* (landlordism) system.

*Kipat*⁹ were the special type of tenure granted on communal basis. A *Kipat* owner derived rights on land by virtue of his membership in a particular ethnic community and

⁶ An individual responsible for tax collection at village level in the Tarai

⁷ A village level revenue collector in the hill region

⁸ A form of *Jimidari* landownership in only three districts in Tarai: Rupandehi, Kapilavastu and Nawalparasi; abolished in 1964

⁹ Customary or communal land tenure system and rights

their location in a particular area. Land ownership under *Kipat* system was limited to certain communities of *Mongoloid* origin, such as the *Limbus*, *Rais*, *Danuwars*, *Sunuwars* and *Tamangs* in the Eastern and Western Hills region of Nepal.

Table 2.2 shows the area under various feudal land tenure systems in Nepal before 1952. Half of the total cultivated land area was under *Raikar* tenure system. 36.30% of land was under *Birta* system followed by 4% of *Kipat*, 2% of *Guthi* and 7.70% of *Jagir* and others tenure system. After 1951, the other forms of tenancy were ended and only *Raikar* and *Birta* were in existence. In 1959, *Birta* was also abolished. As the result of abolition of *Birta* tenure, all *Birta* rights (tax-free grants of land to favored individuals) were cancelled making these subject to normal taxation and the *Birta* forest and non-cultivated land were also returned to the State. However, formal conversion of *Birta* land to *Raikar* land took long time and continued until late 1990s (Wily et al, 2008).

The land act of 1964 abolished intermediary landlordism through transfer of control over tax and administration from *Jimindars* (landlords) to government land revenue offices and later on to the local lobbies (village development committees and municipalities). The result is land tenure system confined to *Raikar* lands, leaving *Raj Guthi* lands autonomous. Moreover, the landlords were permitted to keep their personal lands (*Jiriyat*) core parts of which had been assigned to them originally as part of their emolument. Likewise, the removal of landlordism and transfer of all land except *Guthi* (religious land) into *Raikar*, termed private ownership in land from state ownership. The state provided private property rights in land and taxes are collected from individual landowners. Thus *Raikar* land became private property by 1964. However, the state itself acquired large tracts of *Birta* land, and gained substantially from the confirmation of public land and unregistered land as government land, administered by central or local

governments (Wily et al, 2008). Therefore, there are only three types of land tenure system in existence at present in Nepal known as *Raikar* (private land), *Ailani* (public land) and *Guthi* (religious land).

2.4.2 Historical Evidences of Land Reform

According to Ministry of Land Reform and Management (2012), Nepal has a long history of land reform and management from *Vedic Period*¹⁰. At this time, the land was considered as the main belongings of the state. The state would collect a fixed amount of revenue from land. In *Lichchhabi* rules¹¹ the land administration was regulated by *Gaun Panchali*¹². System of purchasing of land, land survey and land classification based on productivity was introduced by the *Malla* rulers¹³. Later on *Ram Shah*¹⁴, the king of *Gurkha Kingdom*, started a land record maintenance system by dividing the land type into various local units (like *hale*, *kodale*, *mato*, *muri*, *bijan*, *mana*, etc.). The land survey was started in 1873 during the *Rana* regime¹⁵. The chains were used to measure both of the lands of Terai region and the farms of the Hills region whereas ocular measurement was applied to rest of the other parts. The land was categorized in the local units (as *hale*, *pate*, *kute* and *kodale* etc.) based on the local agricultural tools used and the land records were developed on the basis of such categorization.

The timeline, demand and supply side activities of land reform are presented in table 2.3. The major events of land reform are divided into three periods based on historical changes in the political system. In 1951, the authoritative *Rana* regime was

¹⁰ *Vaidic Period* is the period in ancient time in Hindu society where people were guided by the religious principles mentioned in the ethical books such as *Veda*, *Upanisada* and *Manusmriti*.

¹¹ *Lichhavi* rulers ruled the Kathmandu Valley for about 350 years (400 - 750).

¹² A local body as Village Development Committee of present.

¹³ *Malla* rulers ruled the Kathmandu Valley for about 600 years (12th to the 18th century).

¹⁴ He ruled *Gurkha Kingdom*, the origin of Nepal from 1609 -1636.

¹⁵ *Rana* rulers ruled Nepal for 104 years (1847-1951).

abolished and the modern history of Nepal started to begin. Political systems, ideology of rulers, demand and supply sides of land reform activities, reform type and special remarks are presented in this table.

Traditionally, land ownership in Nepal was vested in the State. When Nepal entered in modern era in 1951, there were many forms of land tenure system. The forms of tenure were *Raikar*, *Birta*, *Jagir*, *Guthi* and *Kipat*. Only *Raikar* and *Birta* system remained as major tenure system after 1951 as the result of reforms in the 1950s. The objectives of these reforms were to increase land productivity by securing the right of land holders and tillers.

Formally, land reform started in 1951 after commencing of a new constitution and a land reform law was made in 1957. However, many policies could not come into practice; *Birta* was abolished in 1959. Comprehensive land reform act, The Land Related Act 1964 (Nepal Law Commission, 2012) is the main basis for land reform and land administration in Nepal. The preamble of this act states:

Whereas, it is expedient; to divert inactive capital and burden of population from the land to the other sectors of economy in order to accelerate the pace of economic development of the country; to bring about improvement in the standards of living of the actual peasants dependent on the land by making equitable distribution of the cultivable land and by making easily accessible the necessary know-how and resources on agriculture and to keep up the convenience and economic interests of the general public by providing encouragement to make maximum increase in agricultural production (p. 2).

As mentioned in the preamble, the main objective of this act is economic development by transferring inactive capital and human resource from agriculture to other sectors, improvement in living standards of people by making an equitable distribution of agricultural land, increase in agricultural production by easy access on new technology inputs.

Furthermore, this act also adopted reform measures such as land ceiling, tenancy rights, rent payment criteria, credit provisions to landless people to buy landlords' land, compensation to landlord¹⁶ etc. Before commencement of Land Related Act 1964, the *Jimidari* system (collecting the land revenue and allocating the land for cultivation) was in practice. Under this system, the *Jimidars* (landlords) used to collect land revenue from other holders on behalf of the government. This system was also abolished in 1964 (Adhikari, 2008).

The major reform in the first phase (1950-60) was the abolishment of *Birta* system and in the second phase (1960-1990), the *Jimidari* system but other major reforms were not implemented (Regmi, 1977, Wily et al, 2008). Moreover, in the second phase, land ceilings were weakly implemented and little land was redistributed but landlords rather than tenants often gained from the new rules (Wily et al 2008). In this phase, *Jhapa* land rights movement, *Dhankuta* movement, *Piskar* movements were initiated by the landless and marginal farmers demanding land rights. These movements raised land issues and demanded for the change of *Panchayat* authoritarian system to address their agendas. Later they were suppressed by the rulers.

¹⁶ Chapter 5 of the Land Related Act 1964 has provision about compensation. This states that the Government of Nepal will provide the landowner with an amount of compensation at the prescribed rate for acquisition of land in excess of upper ceiling. After the transfer of the landowner's right to another person, ten percent of the amount of compensation shall be given within one year and the debentures issued by Government of Nepal shall be given for the rest amount. The interest at the rate so prescribed by Government of Nepal that it is neither less than three percent nor more than five percent per annum, shall be given on such debentures.

In early 1990s, the political system changed to multi-party democratic system from one party *Panchayat* system. In this period (1990 to till date), the phase of land reform is known as third phase. Most of the parties include land reform in their agenda but when the parties were in the government, they failed to address the issue effectively. In this phase there were *Tharu* movement, no grain payment movement, *Kamaiya* movement, landless people's hunger strike, etc. The main demand of these movements was the redistribution of land from landlords to the landless tenants and tillers of the land.

After the political change of 1990, people had high aspiration from democratically elected government. During this period, major amendments in economic policies were made adopting liberal economic policies. Additionally to address the land issues, the *Badal* Commission on Scientific Land Reform, 1994, a land reform commission under the co-ordination of parliamentarian *Keshav Badal* was formed. This commission presented the report to the government in 1996. The report submitted was considered important for the overall land reform and addressed the demands made by peasant movements but the successive governments did also not implement the recommendations of this report though *Sher Bahadur Deuba* led government made Fifth Amendment to the 1964 land act. The Fifth Amendment to the Land Related Act 1964 was done in 2002 (hereafter, FALRA 2002) that drastically reduced the land ceiling but was not implemented in practice.

Communist Party of Nepal (Maoist) started a war called "people's war" in 1996 raising many socio-economic and political issues. Among them land reform issue was one of the major issues. The war ended in 2006 with The Comprehensive Peace Accord (CPA) signed between the Government of Nepal and Maoist rebellion. During this war period, they captured the landlords land in many rural part of the country and cultivated collectively. After the CPA, a new interim constitution was made in 2007 and the country was declared as republican state. This constitution and the first three-year interim plan

(2007/08-2009/10) and the on-going three-year interim plan (2010/11-2012/13) has also emphasized on scientific land reform.

Table 2. 3: Timeline and Important Events for Land Reform in Nepal Since 1950

Year	Political System (Ideology of rulers)	Description of Land Reform Activities		Reform Type	Remarks
		Demand Side	Supply Side		
1950-1960	Multiparty system but very unstable (Democratic)	<ul style="list-style-type: none"> Farmer's Movement (1950-1960) Land struggle in Western Nepal Land struggle in Kathmandu valley Struggle in Terai regions 	<ul style="list-style-type: none"> Land Act 1957 Birta Abolition Act 1959 	<ul style="list-style-type: none"> Tenancy Reform 	<ul style="list-style-type: none"> Reform process initiated in 1951 Birta was abolished in 1959 Many policies not applied
		<ul style="list-style-type: none"> Farmer's Agitation and Democratic Movement Jhapa land rights struggle 1970-74 Dhankuta movement 1979 Piskar movement 1983 	<ul style="list-style-type: none"> Land Related Act 1964 		<ul style="list-style-type: none"> Ceiling and Tenancy Reform	Implementation part was weak (Regmi, 1977). Zamindari (landlordism) system was abolished in 1964
1990- Till date	Multi party democratic system (Democratic)	<ul style="list-style-type: none"> Tharu (an ethnic group) movement, 1995 No grain payment to landlords movement, 1997 Kamaiya (bonded labor) movement and Kamaiya concern group began to educate landless people, 1998-2000 Landless people captured land of private company in Banke district, 1999 Hunger strike by landless and marginal farmers, 2004 	<ul style="list-style-type: none"> Kamaiya system was abolished in 2002 The Fifth Amendment to the 1964 Land Related Act was done in 2002 (FALRA 2002) Land Reform Commissions of 1994, 2008, 2009 etc. National Land Utilization Policy, 2012 	<ul style="list-style-type: none"> Ceiling Reform by FALRA 2002 	<ul style="list-style-type: none"> The Interim Constitution of Nepal 2007 mentioned about scientific land reform programs Many attempts were made, but the progress was almost nothing indicating failed reforms (Adhikari, 2008). The reports of land reform commissions were not implemented. National land utilization policy still to be implemented
		<ul style="list-style-type: none"> Landless people are pressurizing political parties and are demanding land for cultivation in the name of land rights concern group, 2005-till date 			

Source: Author's Compilation Based on-Regmi (1977), Wily, L., Chapagain, D. P. & Sharma, S. (2008), Nepal Law Commission (2012), and Community Self Reliance Centre (2009).

To address the land issues, two land reform commissions were formed in 2008 and 2009. The first was named as High Level Land Reform Commission 2008 coordinated by *Haribol Gajurel* and the second was named as High Level Scientific Land Reform Commission 2009 coordinated by *Ghanendra Basnet*. These commissions were made to address the high expectations of landless and marginal farmers but the reports of both the commissions were not fully owned and implemented by the successive governments (Karki, 2002). This is because the government which formed these commissions changed due to instability of government and the successive government did not bother to implement them saying that these were not recommended by their parties.

For the first time, national land utilization policy of Nepal was prepared in 2012. This policy classified land in seven categories named as agriculture land, residential land, commercial land, industrial land, forest land, public land and others land. This classification of land is based on the land pattern for effective land management, conservation and utilization. This policy mentioned about the policies for planned urbanization, reduction in land fragmentation, maximum utilization of agricultural land for productivity, balancing between environment and development, and effective land tax system.

2.4.3 Land Administration and Land Related Laws

In Nepal, the land revenue office (*Mal Adda*) was established in 1896. Similarly, the *Pota Registration Adda*, which was established in 1921, carried out the functions like, approval of written documents (*Likhat Parit*), transfer of land rights (*Namsari*), de-registration (*Lagat Katta*), collection of land revenue, allocation of budget to governmental offices and account keeping. After this, the governmental offices working on land administration began to develop structurally. The map based land recording system was started after the establishment of Cadastral Survey in Bhaktapur district in 1933. The *Survey Goswara* was established in Kathmandu in 1939. The Survey Department and the Department of Land Revenue were established respectively in 1957 and 1959. The district level Land Revenue Offices were established after the political division of the Kingdom into 75 districts in 1978. The significant works undertaken in land related sector after the dawn of democracy in 1951 are: In 1952, *Bhumidari Adhikar Prapti Act* was drafted and formulated the Commission for Land Assessment. The Commission for Land Reformation was formulated in 1953 and it declared 13 term Plan on Land Reformation in 1955. Similarly, the government prepared land and land tenancy records act 1956 and prepared

Land Related Act in 1957. Likewise, *Birta* abolition act was prepared in 1959, which came into effect, and *Birta* system was abolished in the same year. This abolishment of *Birta* system ended the practice of the feudal system of illegal encroachment of the land without paying the government the required revenue.

Moreover, in 1962, the government prepared land survey and measurement act. After this act came into effect, the maintenance of map based land records system was taken into practice. The general objectives of this act were preparation of up to date land-ownership records that were essential for the collection of land revenues and records of tenants that needed for implementation of land reform program.

Similarly, the Land Related Act, 1964, came into effect with the objectives such as: rapid economic development through the proper utilization of land resources, improvement of the livelihood of the land dependent peasants through the equal distribution of agricultural land, and providing them with the easy access of essential knowledge and required tools for the encouragement of farming and high productivity. This act had also provided formal tenancy rights to registered tenants, including the right of one-fourth of the land thus cultivated. According to Lumsalee (2002), although this secured a legal right for the tenants, it also created a situation of dual ownership (ownership of the same land with landlord and tenant) and the problems associated with it. The result has been cultivation of substantial area of land under informal tenancy without any legal security.

Furthermore, in the Terai region, the landlords use tenants from across the border since they (non-Nepalese) cannot claim tenancy rights thus depriving the local landless and small holders from the opportunity of increasing access to land. The situation of dual ownership has also negatively affected land productivity since it was no more attractive for the landlord or the tenant to invest in land improvement. In addition, there was not

sufficient incentive for the tenant to use improved technology since the landlords will equally claim the increased output. The amendment to the Land Act in 1998 removed the possibility of dual ownership. It provisioned that land can be registered under ownership of only a single party. Registered tenants could claim their rights and get their share registered under their own name.

After the establishment of land reform department in 1964 October, the land reform program was carried out nationwide in 75 districts in three distinct phases: 16 districts in the first phase, 25 districts in the second phase and 34 districts in the third phase. The land administration act came into effect in 1967 with the objective of updating the land transactions and records in those districts where cadastral survey work had been completed. This act provided the land administration offices with the authority to execute the works conveyed by the land reform offices and land revenue offices both. After this, the land records system was revised based on new survey in nine districts in the beginning but this practice was applied in all of the 75 districts later on.

The *Guthi* Corporation was established in 1964 with the objective of *Raj Guthi*¹⁷ management. Under the provisions of Guthi Corporation Act, 1976, this corporation has been administering and managing all of the *Raj Guthis* until now. The land revenue act 1978, prepared for carrying out effective land management, provided the land revenue offices the authority to conduct the works conveyed by *Mal Adda* and *Kosh* and *Tahisil* offices, and to carry out the rest of the works operated by land reform offices.

With the commencement of Land Revenue Act 1978, the broad land management area was opened, such as collection of land revenue, land registration establishment of land revenue offices. After this, land revenue offices gradually replaced the *Malpot* offices. The department of land revenue, which was working under the Ministry of

¹⁷ One kind of *Guthi* system, which is in practice until present.

Finance, was included under the Ministry of Land Reform and Management in 1987 with the objective of structural development on land administration and management sector. Likewise, the department of land reform and the department of land revenue were unified into a single department called department of land reform and management in July 2000. Since then, the responsibility of land administration, land management, land revenue collection and land reform are the integral parts of this department.

In case of Nepal, the Land Related Act 1964 was the momentous law for land reform under the rule of King *Mahendra*¹⁸ and still the central land reform legislation today. According to Wily et al (2008), this law made provisions for five instruments to be applied for land reform. They are given in the act as: (i) abolition of intermediaries collecting taxes; (ii) imposition of ceilings and redistribution of the surplus land to needy farmers and institutions; (iii) rent control and other measures to improve the security of tenants; (iv) compulsory savings and credit by farmers; and (v) imposition of measures to improve farming practices. Other sister laws, policies and provisions were initiated to improve land registration and abolish feudal land tenure practices. Moreover, the ceilings were not implemented strictly and landlords rather than tenants benefited from the new rules.

The Lands Act was amended ten times: five times directly (1965, 1966, 1986, 1996, 2002) and through Judicial Administration Reform in 1986, the Judicial Administration Act in 1996 and an Act to Amend Some Nepal Laws, 1999, Amending Some Nepal Acts to Maintain Gender Equality Act, 2006 and Republic Strengthening and Some Nepal Laws Amendment Act, 2010. Among these amendments, the mentionable amendment is the Fifth Amendment.

¹⁸ King *Mahendra* ruled Nepal from 13 March 1955 – 31 January 1972. He suspended the constitution, dissolved parliament, dismissed the elected cabinet and imposed direct rule on 15 December 1960. He instituted a non-Party Panchayat system in Nepal.

2.4.4 Current Ceiling Policies

Fifth Amendment to the Land Related Act 1964 was done in 2002 (FALRA 2002) that drastically reduced the land ceiling in the country aiming to use land in the most productive way (see table 2.4). According to FALRA 2002, land ceiling was reduced by 60 percent in Terai (from 18.40 hectares to 7.45 hectares), 51 percent in Kathmandu Valley (from 3.10 hectares to 1.52 hectares) and 22 percent in all other regions (from 4.90 hectares to 3.81 hectares) including both agricultural and homestead land.

Table 2. 4: Per Household Land Ceiling Policy of Government (in hectares)

Region	Before Fifth Amendment			After Fifth Amendment		
	Agricultural	Homestead	Total	Agricultural	Homestead	Total
Terai	16.40	2.00	18.40	6.77	0.68	7.45
Kathmandu Valley	2.70	0.40	3.10	1.27	0.25	1.52
All other regions	4.10	0.80	4.90	3.56	0.25	3.81

Source: Author's Calculation Based on Land Related Act 1964 (Nepal Law Commission, 2012).

The law made provision of redistributive land reform in favor of poor farmers but the law could not come into force due to many barriers from opposing forces including less will power of political forces. Land reform in Nepal is always being criticized for lack of will power to implement it (Regmi, 1977). Even FALRA 2002 was not properly implemented indicating failed reform on land. The scenario of land distribution would be different if the land ceiling policy of FALRA 2002 were properly implemented.

2.4.5 Household Land Size

The agricultural monograph census of Nepal 2001/02 (Central Bureau of Statistics, 2006), defines landless farmers. The holding areas under crops less than 0.003 hectares (one *Ana*¹⁹) of land in Kathmandu Valley, less than 0.014 hectares (eight *Dhur*²⁰) of land

¹⁹ *Ana* is local measurement unit of land in Nepal. It is used to measure the land of Kathmandu Valley, Hills and Mountains. One *Ana* is equivalent to 342.25 square feet.

²⁰ *Dhur* is also a local measurement unit of land in Nepal. It is used to measure the land of the Terai region. One *Dhur* is equivalent to 182.35 square feet.

in Terai, less than 0.013 (four *Ana*) of land in all other regions are defined as holdings without land or landless farmers. Moreover, this definition of landless households is used throughout this research.

Table 2. 5: Categorization of Households Based on Household Land Size

Household Category	Land Size	Explanation
Rural landless-Kathmandu	0.00-0.003	Landless households have almost no agricultural land, rent in others lands, hire out labors, they are agricultural workers and tenants
Rural landless-Terai	0.00-0.014	
Rural landless-Other regions	0.00-0.013	
Rural marginal-Kathmandu	0.003- 0.06	Marginal households have marginal lands insufficient for their households consumption, rent in others land, hire out labors, they are also agricultural workers and tenants
Rural marginal-Terai	0.014-0.30	
Rural marginal -Other regions	0.013-0.15	
Rural small-Kathmandu	0.06-0.41	Small households have small family farms; almost meet their household consumption need, work on their family farms, rent in and rent out lands as their convenience, also work as exchanged labors (hire in and hire out labors among relatives and neighbors)
Rural small-Terai	0.30-2.00	
Rural small-Other regions	0.15-1.02	
Rural medium-Kathmandu	0.41-1.52	Medium households have family farms sufficient to meet consumption need and surplus is sold in the market, rent in and out some lands and also work as exchanged labors
Rural medium-Terai	2.00-7.45	
Rural medium-Other regions	1.02-3.81	
Rural large-Kathmandu	Above 1.52	Large households have large lands beyond the ceiling, supervise hired in labors and cultivate their lands, also rent out their lands, sell the surplus in the market
Rural large- Terai	Above 7.45	
Rural large-Other regions	Above 3.81	

Source: Author's Compilation Based on- Land Related Act 1964 (Nepal Law Commission, 2012), Monograph Agriculture Census of Nepal 2001/02 (Central Bureau of Statistics, 2006), Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a)

Large households are those, which have land size beyond permitted ceiling by the current land act, i.e., Land Related Act 1964. All the other sizes of land are the classification between landless and large lands. Table 2.5 shows the distribution of households based on land size. This household category (landless, marginal, small, medium and large) is defined across different region. The size of holdings is region specific, for example, large households in Kathmandu Valley are those having above 1.52 hectares of holding size

while in Terai, above 7.45 hectares and in all other regions, above 3.81 hectares. This land size based definition of household categories remains the same in all the chapters of this research work. However, household own land size is used in chapter three and household cultivated land size in chapter four, the categories of households are determined based on these sizes of lands in both cases. The last column of table 2.5 is the explanation of each category of households in terms of allocation of labor and operational distribution of land.

Moreover, landless and marginal households hire out their majority of labor hours and earn wage income. Small and medium household farms use family labor and exchange labor among neighbors and relatives. Family members manage large household farms; they hire in labors and supervise them. In some of the cases, large farms hire in supervisor to take care the hired farm labors. This increases the transaction cost of large household farms. Most of the small and medium households use family labor and exchange labor.

2.4.6 Ownership Distribution of Land

Ownership distribution of land is unequal in nature. Large plots of land are often concentrated in the hands of a few individuals and a majority of individuals has little or no land. Landowners with small plots are often called small holders or small farmers, whereas people with no land at all are called landless. In Nepal, there are many key actors of land reform but the counterparts (landlords) have been always powerful. The little progress in land reform and gradual events such as inheritance rights, population pressure, purchase and sale of land ended up as of the current composition of land own size and distribution across the region (see table 2.6).

Moreover, majorities of households have marginal and small farms and still there are households having land beyond the proposed ceiling by FALRA 2002. There are about three percent of households, which have large sized lands beyond the legal ceiling with

more than 17 percent share in total acreage of households land and 27 percent of landless and marginal households have less than seven percent share in total acreage of household land. This shows that there is huge inequality of land distribution in Nepal.

Table 2. 6: Distribution of Land Holding by Regions and Land Size

Category of Households	Kathmandu Valley		Terai		All other region		All Nepal	
	HH	Acreage	HH	Acreage	HH	Acreage	HH	Acreage
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Landless	52,157 (0.96)	977 (0.04)	214,842 (3.96)	5,584 (0.20)	193,981 (3.58)	4,055 (0.15)	460,980 (8.50)	10,616 (0.40)
Marginal	113,517 (2.09)	14,186 (0.53)	467,598 (8.62)	81,105 (3.10)	422,195 (7.78)	58,902 (2.22)	786,378 (18.50)	154,193 (5.81)
Small	346,143 (6.38)	97,616 (3.68)	1,425,829 (26.29)	558,105 (21.00)	1,287,382 (23.74)	405,316 (15.27)	3,276,214 (56.41)	1,061,037 (39.98)
Medium	85,835 (1.58)	88,313 (3.33)	353,572 (6.52)	504,919 (19.00)	319,240 (5.89)	366,690 (13.82)	758,719 (13.99)	959,923 (36.17)
Large	15,954 (0.29)	43,070 (1.62)	65,716 (1.21)	246,248 (9.30)	59,335 (1.09)	178,834 (6.74)	141,006 (2.60)	468,151 (17.64)
Total	613,606 (11.31)	244,162 (9.20)	2,527,557 (46.61)	1,395,961 (52.60)	2,282,133 (42.08)	1,013,797 (38.20)	5,423,297 (100.00)	2,653,919 (100.00)

Source: Author's Calculation Based on- National Population and Housing Census 2011 (Central Bureau of Statistics, 2012), Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a), Monograph Agriculture Census of Nepal 2001/02 (Central Bureau of Statistics, 2006); Note: Size- in hectares (ha), HH-number of households, Acreage-in hectares (ha), (%) - share in all Nepal total

In overall, 8.5 percent households are landless farmers with 0.4 percent land in total acreage. 18.50 percent households are marginal farmers with 5.81 percent share in total acreage. Majority 56.41 percent households are small farmers with 39.98 percent share in total acreage. 13.99 percent medium farmers have 36.17 percent share in total acreage and 2.60 percent large farmers own 17.64 percent acreage of land.

In order to make unequal distribution a more equitable one, effective land reform is the most, which also is the main objective of the current land act. Moreover, regarding the current situation of land distribution in Nepal, Adhikari & Bjorndal (2012) mention:

Landowners, who have more agricultural land, have fewer farming skills, and those with more skills have less adequate land for cultivation. Cultivation methods are still non-mechanized. The landholding class that extracts the major share of the agricultural surplus largely invests in sectors other than agriculture. Agricultural productivity is much lower than in other countries in the region. Consequently, the relationship between land and poverty is embedded in Nepalese agrarian society (p. 3298).

2.4.7 Operational Distribution of Land

In reality, small holders have excessive family labor, whereas, owners of huge tracts of land have to leave their land uncultivated for want of labor. Either individual with excess labor will seek employment with large landowners or land will be leased (or sold) to small holders or both. The labor market will typically function with large farmers who hire the labor of those with little or no land for wage. Under this scenario, the agricultural market is cleared by allocating labor from those who have little land to those who have a lot. (In this situation, demand of land= supply of land or demand of labor = supply of labor).

Hired supervisors or the owner of the farm, monitors the hired labors and the end result looks like a setting in which large plantation hire large amounts of labor. The land rental market typically works with tracts of land leased from property owners to tenants in exchange for rent or perhaps a share of crop. Under this scenario, the result is a relatively equal distribution of land with many tenants, which is known as operational distribution of land²¹. There are three types of operational distribution of land based on output, risk,

²¹ For more detail, see Ray (1998, pp. 409-410).

incentive, landholding and regions. They are defined as land operated by family owner; tenancy (fixed rent and share cropping) and using wage labor.

Table 2.7 shows the existing scenario of operational distribution of land in the developing countries all around the world. In case of family owned farm, the landlord solely bears the risk and enjoys the output because this type of land is operated by him/her. The incentive is high for the landlord. Often, small farms of East Asia and Sub Saharan Africa are operated and owned by family themselves. In case of fixed rent tenancy, the tenant bears the risk and enjoys most of the output (gives certain output to the landlord according to the contract). She/he has high incentive because if more output is produced he will get more (marginal output). Often, fixed rent tenants operate middle-sized farms of South Asia and South East Asia.

Table 2. 7: Scenario of Operational Distribution

Title	Family Owner	Tenancy		Wage Labor
		Fixed Rent	Share Cropping	
Output	Owner	Tenant	Shared	Landlord
Risk				
Bearing	Owner	Tenant	Shared	Landlord
Amount	High	High	Moderate	High
Incentive	High	High	Moderate	High
Landholding	Small	Middle	Middle	Large
Regions	East Asia, Sub Saharan Africa	South Asia, South East Asia		Latin America

Source: Author's Compilation Based on Development Economics (Ray, 1998)

In case of sharecropping, the risk is shared between landlord and tenant because they share input as well as output. The tenant has moderate incentive because he gets only a share of marginal output and rest goes to landlord. Sharecropping tenants operate middle-sized farms of South Asia and South East Asia. In case of farms operated in wage labor, the landlord bears high risk and enjoys the output. The landlord has high incentive but the tenant (labor) has low incentive because the landlord gets the whole output and gives the labor only his fixed wage. In the absence of supervision, the labor has moral hazard

problem. Therefore, the landlord needs to bear extra transaction cost for hiring supervisor or supervise him/herself. The large farms of Latin America are operated in wage labor system.

Table 2.8 shows the seasonal operational use of land endowment in Nepal. Figures show that 81% households crop themselves in wet season while only 71% households crop themselves in dry season. About 14% households give their land to tenants for sharing cropping tenancy in dry season. Only 7.46% households provide their land for sharing cropping in dry season. Fixed rent tenancy is around 3% in both seasons while larger proportion of households keep their land as fallow (18.88%) in dry season than in wet season (2.31%).

Table 2. 8: Use of Land Endowment (in percent)

Tenure	Wet Season	Dry Season
Cropped own self	81.00	70.86
Sharecropped out	13.72	7.46
Fixed rent out	2.97	2.80
Land left fallow	2.31	18.88
Total	100.00	100.00

Source: Author's Calculation Based on Nepal Living Standard Survey 2010/11

Moreover, absentee landlords and large holders rent out their lands to both the landless tenants and small holders on tenancy (sharecropping and fixed rent) basis. Most of the rented out land is under mixed tenancy, i.e. the cultivators do cultivate some of their own land and rent in land on share cropping basis.

Likewise, table 2.9 shows the operational distribution of land in Nepal. We can see that most of the landless households (76.46%) have no land operated or rented. Due to lack of land, they work as agricultural wageworkers and do small business. About 19% of them rent others land and cultivate. Only 3.76% of them have self-operated land only. 60% of marginal households have self-operated land only and 31% have self-operated and rented

in land. 5% have only rented in land and 3% have self-operated, rented in and out land. Due to lack of land, none of the marginal households have rented out land only.

In case of small households, data show that 61% have self-operated land only, 24% have self-operated and rented in land, 3% have rented out land only and 10% have self-operated and rented out land. Similar pattern is observed in medium households too. Majority of these two types of households (about two third) have more self-operated land only. They use family labor to cultivate their own land and sometimes exchange labor. About one third of large households have land operated by themselves; 40% households in this category have self-operated and rented out land and 6% of them have rented out all of their lands.

Table 2. 9: Operational Distribution of Land by Household Category (in percent)

Land operation type	Landless	Marginal	Small	Medium	Large	Average
Self-operated land only	3.76	59.92	61.37	61.57	34.36	53.42
Rented in land only	18.68	5.18	0.14	0.00	0.00	2.51
Rented out land only	0.00	0.00	3.01	2.70	5.98	2.92
Self-operated and rented in land	1.10	30.65	23.87	11.89	12.57	20.56
Self-operated, rented in and out land	0.00	2.67	1.22	2.06	6.91	1.05
Self-operated and rented out land	0.00	0.00	10.39	21.79	40.18	8.44
No land operated or rented	76.46	1.58	0.00	0.00	0.00	11.10
Total	100.00	100.00	100.00	100.01	100.00	100.00

Source: Author's Calculation Based on Nepal Living Standard Survey 2010/11

In an average, more than half percent of households operate their own land only. 21% have self-operated and rented in land, 8% have self-operated and rented out land while about each 3% have only rented in or rented out land. Moreover, in average 11% do not have any self-operated or rented land.

2.4.8 Land Rental Arrangements: Fixed Rent vs. Sharecropping

Land tenure refers to arrangements or rights under which the holder holds or uses holding land. Besides, self-operated lands, there are mainly two types of tenancy in Nepal- share cropping and fixed rent arrangements. Among them, most common is sharing

cropping tenancy. In this tenancy system, the landlord and the tenant have a contractual arrangement in which they share both input and output in certain proportion. In Nepal, the more common share cropping tenancy is 50-50 share cropping tenancy. In this arrangement, landlord and tenant share both input and out-put in equal proportion.

Risk lover tenant prefers fixed rent contract with higher spread of returns. Risk avert tenant prefers sharecropping contract with lower spread of returns. Fixed rent is more efficient than sharecropping because of higher incentive for both tenant and landlord. Incentive for landlord is the highest in case of wage labor contract and incentive for tenant is the highest in case of fixed rent contract. The landlord offers the fixed rent contract only to tenants with sufficient wealth. The poor with limited wealth end up with sharecropping. Most of the poor in the world live in South Asia; therefore sharecropping is still common in South Asia including Nepal. A high ability tenant prefers fixed rent contract while a low ability labor prefers sharecropping contract. Research says that there is inverse relationship between farm size and productivity. Small farm is more productive than large farm. Own labor is cheaper than hired labor and self-motivated. Hired labor needs supervision.

Table 2. 10: Contractual Arrangements by Household Category (in percent)

Contract type	Landless	Marginal	Small	Medium	Large	Average
Share-cropping	78.46	71.89	70.81	63.33	0.00	71.40
Fixed -rent	21.54	28.11	29.19	36.67	100.00	28.60
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Author's Calculation Based on Nepal Living Standard Survey 2010/11

Table 2.10 shows the contractual arrangements in Nepal by household categories. Majority of households in each category except large preferring sharecropping contract more than fixed rent contract. In case of large, they prefer only fixed rent contract. This is because they prefer more risky contracts so that they would have more incentive. They have more land than others do and they could have more credit opportunities keeping their land as collateral. This observation is consistent with the theory in contract that wealthier prefer more risky contracts.

2.4.9 Land Market Situation

Land markets are active in Nepal. Sometimes land markets also play important role for reforming agricultural land if landlords are selling more lands and landless are buying more land. These operations sometimes may represent the market-led land reform. Comparing cross-section household level data in 15 years interval, we do not see consistent trend in landless, small and large households but we see consistent trend in marginal and medium households (see table 2.11). In both point of time, marginal households are the net sellers and the medium are the net buyers. In 1995/96, landless are net buyers. This is good for land reform but large households are also net buyers, which is not supposed as worthy for land reform.

Table 2. 11: Buy and Sell of Agricultural Land (in hectares)

Household Category	1995/96				2010/11			
	Buy	Sell	Net (Buy-Sell)	Remarks	Buy	Sell	Net (Buy-Sell)	Remarks
Landless	0.0034	0.0002	0.0033	Net Buyer	0.0026	0.0034	-0.0009	Net Seller
Marginal	0.0042	0.0074	-0.0032	Net Seller	0.0029	0.0081	-0.0053	Net Seller
Small	0.0216	0.0232	-0.0016	Net Seller	0.0101	0.0075	0.0026	Net Buyer
Medium	0.2518	0.1883	0.0635	Net Buyer	0.0199	0.0143	0.0055	Net Buyer
Large	0.4345	0.2961	0.1384	Net Buyer	0.0141	0.0352	-0.0210	Net Seller
Average	0.0449	0.0413	0.0037	Net Buyer	0.0083	0.0075	0.0009	Net Buyer

Source: Author's Calculation Based on Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a), Nepal Living Standard Survey 2095/96 (Central Bureau of Statistics, 1996)

In 2010/11, landless, marginal and large are net sellers while small and medium are net buyers. Since, landless and marginal households are selling land; this is not helping for land reform but contributing to create more landless households. However, the large are net sellers, which is good for land reform. In average, the land market operation is not helping for land reform in Nepal.

In Nepalese household economy, land purchasing and selling are common. The landless and marginal households sell their land as the last resort for coping risks since there are no insurance markets in the absence of collateral (land). Unfortunately, landless

or marginal farmers cannot directly purchase land from the big landowners because of market failures. Credit markets do not function well enough to provide them with a loan. In the contrary, households with more wealth and lands have general tendency to buy more lands as having more land is considered as more prestigious among others because this shows higher social status, more power and political influence.

2.4.10 Land Endowment and Land Input

An agricultural household or agricultural holding is an economic unit of agricultural production under single management comprising all livestock and poultry kept, and all land used wholly or partly for agricultural production purposes (Central Bureau of Statistics, 2011). Each agricultural household has some land either only homestead or both homestead and agricultural. Household own land size is also known as household land endowment. The land, which is used for cultivation of agricultural crops, is called cultivated land. The land cultivated by a household is also known as operated land or land input.

Moreover, total household land endowment includes self-operated own land, land rented out to others and unused own land or left fallow land (*Parti*). Similarly, total household land input is the land used for agricultural production as one of the inputs among other inputs. Land input is further defined as the sum total of household land endowment and rented in land from others less household own land rented out to others and unused land. Table 2.12 shows household self-operated own land, land rented in from others, land rented out to others, unused own land, household total land endowment and household total land input. We see that in average total household land endowment is larger (0.5941 hectares) than total household land input (0.5805 hectares).

Table 2. 12: Household Land Endowment and Land Input (in hectare)

Household Category	Self-operated own land	Rented in from others	Rented out to others	Unused own land	Land endowment	Land input
Rural landless-Kathmandu	0.0127	0.0000	0.0000	0.0042	0.0170	0.0127
Rural landless-Terai	0.0004	0.0582	0.0000	0.0000	0.0004	0.0586
Rural landless-Other regions	0.0002	0.0128	0.0000	0.0000	0.0002	0.0130
Rural marginal-Kathmandu	0.0488	0.0141	0.0000	0.0000	0.0488	0.0629
Rural marginal-Terai	0.1315	0.1539	0.0000	0.0028	0.1343	0.2854
Rural marginal -Other regions	0.0767	0.0328	0.0000	0.0031	0.0798	0.1095
Rural small-Kathmandu	0.1678	0.0356	0.0102	0.0000	0.1780	0.2034
Rural small-Terai	0.6415	0.2379	0.1107	0.0103	0.7624	0.8794
Rural small-Other regions	0.4258	0.1227	0.0324	0.0265	0.4847	0.5485
Rural medium-Kathmandu	0.6506	0.0989	0.1178	0.0177	0.7861	0.7496
Rural medium-Terai	2.5775	0.4838	0.4502	0.1020	3.1297	3.0614
Rural medium-Other regions	1.3233	0.3041	0.1435	0.1221	1.5889	1.6274
Rural large-Kathmandu	1.9567	0.0000	0.3033	0.0450	2.3050	1.9567
Rural large- Terai	11.5301	0.0000	2.7090	0.5260	14.7651	11.5301
Rural large-Other regions	3.3091	0.0000	1.9975	0.6527	5.9593	3.3091
Average	0.4915	0.0890	0.0779	0.0248	0.5941	0.5805

Source: Author's Calculation Based on Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a)

From the last two columns of table 2.12, we can clearly see that in case of landless, marginal and small households land input (operated or cultivated land) is higher than land endowment (own land). However, in case of medium and large households the case is just opposite. They have more own land than cultivated land because they rent out more land than rent in and some of their land is kept as unused land. This unused land may have significant impact on reducing efficiency in production process. Economic theory says that operational distribution of land is more equal than ownership distribution (Ray, 1998, pp. 409-410), which is consistent in Nepalese case too.

Figure 2.1 shows the relationship between household land endowment and household land input. In general, higher the land endowment, higher is the land input and vice versa but not exactly proportional. This is because; operational distribution of land is more equal in nature than ownership distribution of land.

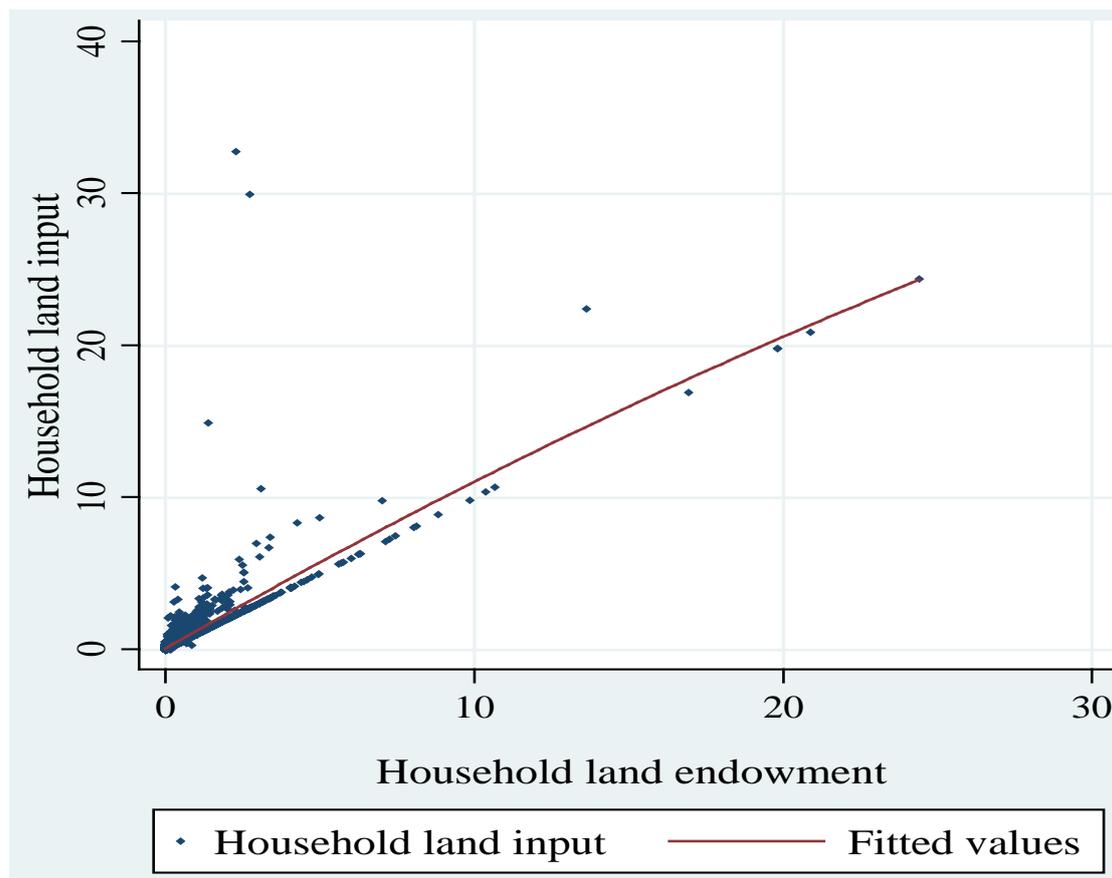


Figure 2. 1: Relationship between Household Land Endowment and Land Input
 Source: Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a)

2.4.11 Family Structure, Labor Allocation and Source of Household Income

Table 2.13 shows the family size and working age population by household category. Ranging from one member to 20 members in a household, the average household size in Nepal is 4.95. Large households from Kathmandu and Terai region have smaller household size while medium households from Terai and large households from other regions have larger household size. Household size ranges from three to seven in an average.

Working age is defined as age between 15 years to 59 years in Nepal (Central Bureau of Statistics, 2012). Working age is very important for generating household income. If a household had more members in this age group, household could be engaged in more labor-intensive production activities like that of agricultural cultivation. The last

three columns of table 2.13 show mean, minimum and maximum working age members in households. Medium households from Terai region have highest values of 3.44 persons of working age population and landless households from Kathmandu region have lowest values of two persons of working age population. The working age population ranges from zero to 10 for all households and in an average each household categories has two to four working age members in a household.

Table 2. 13: Family Structure and Working Age Population

Household Category	Family Size (number)			Working Age Population (number)		
	Mean	Min	Max	Mean	Min	Max
Landless-Kathmandu	3.33	2	5	2.00	1	4
Landless-Terai	4.92	1	15	2.34	0	9
Landless-Other regions	3.78	1	11	2.29	0	7
Marginal-Kathmandu	3.53	1	6	2.76	1	5
Marginal-Terai	4.80	1	16	2.37	0	7
Marginal -Other regions	4.31	1	10	1.93	0	6
Small-Kathmandu	4.35	1	9	2.58	0	6
Small-Terai	5.61	1	20	2.68	0	7
Small-Other regions	4.71	1	15	2.23	0	9
Medium-Kathmandu	4.79	1	7	2.28	0	5
Medium-Terai	6.81	1	18	3.44	0	10
Medium-Other regions	5.32	1	15	2.57	0	9
Large-Kathmandu	3.00	2	4	2.12	1	4
Large- Terai	3.01	2	4	2.72	2	3
Large-Other regions	6.23	3	10	3.23	1	6
Average	4.95	1	20	2.40	0	10

Source: Author's Calculation Based on- Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a)

Nepal is multi-ethnic, multi-cultural country. There are many cultural and social practices in the country. Consequently, household structure is also influenced by cultural practices. Some minor ethnic groups want to live in joint family. For example, *Tharu* people want to live in joint family or large family structure. Similarly, traditionally *Newar* ethnic group in urban area usually lives in joint household, which contained some nuclear families. This is a complex type of structure in which each nuclear family has their own household budget but they divide total household income (for example, the house rent

income) among each nuclear family and live in the same house. They jointly decide about the production and investment. On the other hand, majority households in rural areas have practices of large family. Since most of the people in Nepal have main economic activities dependent on subsistence agriculture, Nepalese population preferred to live in large households. This is because agriculture is labor-intensive and people thought that large family has more benefit with higher production in agriculture. Therefore, people preferred to live in a large household.

In the process of development and increasing trend of urbanization, the traditional practices or norms have been gradually changing and the household structure has been affected. Furthermore, people engaged in other economic activities rather than agriculture prefers to reside in comparatively smaller family. Therefore, in urban areas nuclear family practice is increasing.

According to recent population census (Central Bureau of Statistics, 2012), being male dominated society, most of household has usually reported the male member of household regardless of age as the head. Female-headed households in the country have increased by about 11-percentage point from 14.87% in 2001 to 25.73% in 2011. The working age population (aged 15 to 59 years) has increased from 54 percent in 2001 to about 57 Percent in 2011.

Table 2.14 shows household labor allocation in agriculture and the share of household labor hours in agriculture and non-agriculture. Family labor and hired in labor is the labor allocated for own household agricultural production. Hired out labor is the labor allocated for other households' agricultural production. Hired out labor either earns wage or is used for labor exchange among neighbors and relatives. Landless households have majority of their labor hours allocated for hired out labor for earning wage income in

agriculture. Due to lack of land, they only use few hours in their own production activities as family labors. They do not hire any labor for their own production activities.

Table 2. 14: Allocation and Share of Labor in Agriculture and Non-Agriculture

Household Category	Household labor allocation in agriculture (hours)			Share of total labor hours (in percent)	
	Family labors	Hired in labors	Hired out labors	In Agriculture	In Non-Agriculture
Landless-Kathmandu	46.42	0.00	994.34	51.10	48.90
Landless-Terai	50.49	0.00	1173.59	54.60	45.40
Landless-Other regions	172.58	0.00	1040.71	59.30	40.70
Marginal-Kathmandu	314.56	14.87	766.45	60.66	39.34
Marginal-Terai	342.40	26.60	889.22	72.07	27.93
Marginal -Other regions	412.60	34.60	682.92	79.88	20.19
Small-Kathmandu	579.13	352.18	420.16	62.65	37.35
Small-Terai	1,132.20	315.10	402.44	77.64	22.36
Small-Other regions	1,250.78	259.36	394.13	80.23	19.77
Medium-Kathmandu	1,653.53	742.34	685.35	59.43	40.57
Medium-Terai	2,134.00	835.09	509.22	77.38	22.62
Medium-Other regions	2,223.09	737.04	341.92	76.00	24.00
Large-Kathmandu	777.18	1,321.32	23.22	64.50	35.50
Large- Terai	1,149.57	1,930.57	26.87	73.00	26.00
Large-Other regions	947.95	1,794.84	56.87	67.11	32.89
Average	1,093.75	496.39	433.95	73.28	26.72

Source: Author's Calculation Based on Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a)

Marginal households also hire out their majority of labor hours. Small and medium households use both family and hired in labor in their production and hire out labor hours for exchange of labor. In case of large households, the hired in labors are larger than family labor hours. They also allocate few labor hours for hired out labors for exchanging labor. The last two columns of table 2.14 show the share of household labor allocation in agricultural and non-agricultural activities. In average, 73.28% household labor hours are allocated for agriculture sector and rest 26.72% of labor hours are allocated for non-agricultural sector. The labor allocation varies across household categories.

Table 2. 15: Source of Household Income and Rental Value of Land and Labor

Household Category	Source of Household Income (percent)				Rental Value of	
	Wage Income	Land Rental Income	Remittance Income	Other Income	Land (Rupees/hectare)	Labor (Rupees/hour)
Landless-Kathmandu	23.52	0.00	7.71	68.77	68,270.12	28.87
Landless-Terai	49.75	0.00	11.49	38.76	64,511.09	21.37
Landless-Other regions	32.99	0.00	10.00	57.01	42,815.80	20.50
Marginal-Kathmandu	7.97	0.00	72.37	19.66	69,568.54	27.54
Marginal-Terai	43.39	7.87	14.38	34.36	65,690.80	20.59
Marginal -Other regions	49.64	8.94	22.39	19.03	43,769.87	19.9
Small-Kathmandu	44.15	10.09	4.09	41.67	70,140.65	29.64
Small-Terai	31.97	20.10	15.59	32.34	62,468.53	22.76
Small-Other regions	41.52	15.30	12.85	30.33	44,780.95	21.34
Medium-Kathmandu	32.08	3.41	13.51	51.00	67,543.32	30.65
Medium-Terai	8.01	16.19	12.72	63.08	61,560.65	21.97
Medium-Other regions	16.34	14.59	12.29	56.78	41,234.54	19.76
Large-Kathmandu	18.19	6.59	15.95	59.27	66,851.80	29.8
Large- Terai	15.52	17.83	9.04	57.61	62,890.62	21.37
Large-Other regions	29.28	5.02	24.61	41.09	40,370.65	20.54
Average	37.83	12.80	14.18	35.19	62,297.51	21.25

Source: Author's Calculation Based on Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a), Social Accounting Matrix of Nepal 2010/11 Estimated by Author

In average, more than one third of household income comes from wage income in Nepalese households. About 13% income comes from land rental income, 14% from remittance income and 35% from other sources of income such as capital rental income, enterprises income and transfer income from government. Landless households have no land rental income but substantial amount of wage income. Marginal households have land rental income below average but higher wage income and substantial remittance income. Small households have higher land rental income than landless and marginal. Medium and large households have higher land rental income and substantial share of all types of incomes (see table 2.15).

The last two columns of table 2.15 show the rental value of land and labor. In an average, rental value of land (land rent) is 62,297.51 Rupees per hectare and rental value of labor (wage) is 21.25 Rupees per hour. Land rental value varies across region depending

upon land quality and use of land in production of different crops while wage also varies across region depending upon reservation utility or opportunity cost of labor and the general price level in the region.

2.4.12 Situation after Five Decades of Comprehensive Land Policy

The first comprehensive land policy of Nepal, the Land Related Act 1964 was amended five times and the latest amendment was in 2002 as mentioned above (i.e., FALRA 2002). Beside the amendment of this law, commencement of some other new laws or amendment of other laws also affect this law. The latest was- Republic Strengthening and Some Nepal Laws Amendment Act, 2010. This act also amended some of the clauses of land related act 1964. Moreover, the policy adopted in land related act 1964 is the basis for land reform in Nepal. Therefore, some of the indicators are compared, which are related to land, land productivity, agricultural growth, inequality and poverty after about five decades of commencement of land reform law. This comparison will help us to evaluate the success or failure of land reform in Nepal.

In table 2.16, the indicators of the year 1961/62 are before the commencement of land reform law and all others are after. We see that the size of household land was 1.11 hectares (ha) in 1961/62, decreased to 0.97 ha in 1971/72 but increased to 1.13 ha in 1981/82 and then gradually decreased and reached to 0.70 ha in 2010/11. This shows that average household land size is decreasing over time. Similarly, number of parcels per households is also gradually decreasing from 6.80 in 1961/62 to 2.80 in 2010/11 except in 1971/72 (7.20). The households operating less than 0.5 hectares is increasing from 26.88% in 1961/62 to 52.70% in 2010/11. This is because of the inheritance right in land that the size of household land and the number of parcels decreasing but the share of households

operating smaller land is increasing. As the households separate, the land also gets divided into the inheritors. These indicators show that land fragmentation is gradually increasing.

The percentage of households with their own agricultural land was 78% in 1961/62, increase to 86.10% in 1971/72 and to 91.80 in 1981/82 but decreased to 67.90% in 1991/92 and then again increased to 73.30 in 2001/02 and almost constant for 2010/11 (73.90). The percentage of households with no agricultural land was 22% in 1961/52 gradually decreased to 8.20% in 1981/82 but increased to 32.10% in 1991/92 and slightly decreased in 2001/02 and 2010/11.

Table 2. 16: Six-Decade Comparison (1961/62-2010/11)

Category	1961/62	1971/72	1981/82	1991/92	2001/02	2010/11
Size of HH land (ha)	1.11	0.97	1.13	0.96	0.80	0.70
Number of parcels per HH	6.80	7.20	4.40	4.00	3.30	2.80
HH operating < 0.5 ha (% of total)	26.88	30.30	34.15	38.50	43.40	52.70
HH with no agricultural land (% of total)	22.00	13.90	8.20	32.10	26.70	26.10
Irrigated land (% of total)	12.51	15.40	23.70	34.00	44.00	54.40
Cereal Yield (mt/ha)	1.84	1.71	1.70	1.84	1.95	2.48
Agricultural growth rate (%)	4.12	0.73	4.58	2.15	4.42	4.51
Land inequality (Gini index)	0.64	0.63	0.65	0.52	0.51	0.51
Poverty head count rate (%)	-	36.20	42.60	49.00	33.60	25.20

Source: World Development Indicators (World Bank, 2013), Central Bureau of Statistics, Nepal website (Central Bureau of Statistics, 2013a); Note: HH-household, ha-hectares

Since there is no consistent pattern of increasing and decreasing of landless households, it is not the cause of land reform rather because of natural disasters such as flooding in the hills and urbanization in the city areas and also due to buying and selling of land and buildings. Some people sell the agricultural land and buy building in urban areas or invest in commercial activities and vice versa. This will change the percentage of landless people and importantly most of the urban landless households are not poor and they are also not eligible to get land in the process of land reform.

Data show that percentage of irrigated land is increasing gradually and agricultural productivity of land (cereal yield) is also increasing in the last decade. Since paddy needs

irrigation, the production of paddy is increasing with irrigation facility increasing the productivity of land. The agricultural growth is also not in consistent trend and growing very slow rate. Moreover, poverty and inequality also show inconsistent trends. Though, poverty is decreasing for recent years the inequality in land is the same. This also shows that decrease in poverty is due to some other reasons than land reform. Statistics show that the recent drop in poverty level is because of the large amount of remittance inflow from abroad. In recent years, transfer of income from abroad is about 20% of GDP (Ministry of Finance, 2013) which is mainly transfer of workers' remittance. In this context, Sapkota (2013) mentions that 56% of households received remittances in 2010/11. This remittance has increased expenditure capacity of households and widened the consumption basket of poor households dropping the poverty level in the country.

From the comparison of indicators presented in table 2.16, we can conclude that increase in irrigation facility may have some impact on increase in land productivity and increase in household income but there is no any evidence, which supports that there was implementation of land reform law, which caused to reduce poverty, inequality or increase productivity. Therefore, we can conclude that after the five decades of land reform law, there is no improvement in equity, efficiency and economic growth in Nepal, which proves that land reform, was not successful because of the lack of implementation. Studies of Regmi (1977), Wily et al (2008), Adhikari (2008), etc. also have same evaluation that land reform in Nepal was failed because of the weakness in implementation part.

2.4.13 Land Fragmentation and Land Consolidation

As we see in table 2.16, the average household land size is decreasing over time. Similarly, number of parcels per households is also gradually decreasing but households operating less than 0.5 hectares of land are increasing over time. This is because of the

inheritance right in land that the size of household land and the number of parcels decreasing but the share of households operating smaller land is increasing. As the households separate, the land is divided into the inheritors. As land fragmentation increases borderland, travel time, transaction costs, and transportation costs and reduces efficiency of farmers, land fragmentation is another structural problem in Nepal, mainly caused by right of succession to parental lands properties. This is because many parents seek to distribute all their land fairly among offspring (Lipton, 2010, p.237).

According to Lumsalee (2002), the land fragmentation and small size of parcels pose a difficult problem for agricultural modernization. The smallholdings of the households are scattered making it difficult to use modern technologies for improving productivity. If the current legal provision regarding the succession to parental property continues, it is inevitable that the situation will worsen in the future. One of the possible solutions of this problem is land consolidation measures that would equitably benefit the households according to the size of their holdings.

In this context, control of fragmented land and land consolidation are the integral part of land reform in Nepal. Chapter 9A of the Land Act 1964 (Nepal Law Commission, 2012), which was included after the Fifth Amendment; mentions about the control of land fragmentation and promoting land consolidation. The act states: “In order to enhance the productivity of land, Government of Nepal may operate a program relating to land fragmentation control and plotting (*Chaklabandi*), as prescribed” (p 58). Similarly, almost all the reports of land reform suggestion commissions emphasized the land consolidation. Thus, land consolidation comprises actions of government through markets or schemes to reduce the number of plots into which a farm is divided.

According to the Land Act 1964, there are four major categories of land reform issues in Nepal namely; tenancy reforms, abolition of intermediaries, ceilings on

landholdings that allowed surplus land to be redistributed to landless households; and land consolidation reforms that required consolidating fragmented land holdings. Since, tenancy reform and abolishment of intermediaries (*Jimidari* system) were already done; the remained are the redistributive reform and land consolidation. Therefore, in this study, focus is given mainly on redistributive land reform and productivity augmenting reform (utilization of all of the cultivable land and reduction in land fragmentation) by eliminating inefficiencies in cultivation.

2.4.14 Key Actors and Their Role

Key actors of land reform are the landless and marginal farmers, land right concerns groups, political parties, government agencies, and off course the landlords as counterparts. These all actors are playing their role in Nepal. The power check and balance between these actors in the given environment is responsible either the reform laws are implemented or not.

Landless tenants and marginal farmers are the major demanders of land reform. The freed *Kamaiya* and *Haruwa/Halia*²² are the real landless people. They are demanding land as they have farming skills and experience of working in landlords' land. They are hardworking and real tillers of land. After the abolishment of *Kamaiya* system in 2002, they are working as agricultural wage labors. Other landless people are the migrants from Hills to Terai and from Hills and Terai to urban areas. Some of the landless people are settled in public places near river basin and forest in Terai region. Some are settled in public places of major cities such as Kathmandu metropolitan area. These landless people claim themselves as landless and participate in landless movements. Moreover, these landless people are also affiliated with some political parties and trying to raise their voice

²² *Haruwa* in Terai and *halia* in hills are the ploughman working for free to pay off debts of landlords

in higher level of the parties. For the purpose of identification of beneficiaries, proper identification of landless people is needed. This can be done with the help of local communities and can be verified in the place of their origin. Marginal farmers are the farmers holding themselves insufficient land for their livelihoods.

Land right concern groups are formed including the landless and marginal farmers together with human right activists, persons working in non-governmental as well as international non-governmental organizations, the donor agencies, etc. They often raise land related issues in international arena in favor of landless and marginal farmers and internationalize the voices of landless people by their publications. The major political parties (the left wings, democratic wings and the right wings) have included land reform issues in their agendas. They are using landless, marginal farmers and the poor rural people as their vote bank. They are always giving attractive slogans to lure the people in favor of their interests. They never make common consensus to implement reform rather try to pretend that they are always in favor of landless and poor people.

The government agencies are the central government, local governments and the bureaucratic system. The government agencies are responsible to implement land reform laws and work as land administrators. The skill and knowledge of personnel working in land administration is very important to keep records update for implementation of land reform. The government's will power to implement reform measures can bring successful reform. Finally, landlords are the counterparts of land reform. They have always tendency to oppose land reform because in short-run they are the losers from implementation of land reform. They try to influence the government, the bureaucrats and the parties with their elite power as well as monetary power and always try to skip the implementation of land reform.

2.5 Summary of Land Reform Implementation around the World

Most of the successful land reforms have both equity and efficiency aspect (Hoogeveen & Kinsey, 2001) and also have significant impact on macro-economy. Land reforms are aimed at distribution from rich to poor keeping social justice (Deininger, 2003). Land reforms also increase efficiency in long run and have positive impact on macro-economy. In the short run, there may be trade-off between equity and efficiency in some cases. Equity is related to reducing poverty and inequality but efficiency is related to increasing productivity and growth (Bardhan, 1996). Furthermore, land reform has a significant and positive impact on income growth and accumulation of human and physical capital (Deininger, Jin & Nagarajan, 2009).

Table 2.6 summarizes the equity, efficiency and economy aspects of successful as well as failed reforms with remarks. As mentioned under section 2.3.1, the most successful land reforms were implemented in Japan, Korea and Taiwan. The major forms of reforms were redistribution of land, land to the tillers and abolishment of the landlordism. These reforms had all the aspects such as equity, efficiency and significant impact on macro-economy. In fact, after successful reform, rapid economic growth started in Japan. Land reform also helped to maintain social justice and democratization of Japanese society (Ladejinsky, 1960, Kawagoe, 1999). Similarly, the reform reduced inequality and increased the efficiency of tillers as they received land rights (Rasid, 2000, Quizon, 2005). Similar impacts were observed in case of Korea and Taiwan (Quizon, 2005). In other cases, mixed impacts were seen.

In failure cases, the impacts were insignificant. Vietnam and China were successful to collectivize the private land under state control. They could reduce poverty and increase productivity but later on de-collectivized the land and leased to private companies and individuals in China and to the tillers in Vietnam.

Table 2. 17: Summary of Land Reform Implementation in Different Countries

Country	Reform Period	Major Reform Policies	Impact on			Remarks	Source of Literature
			Equity	Efficiency	Economy		
Japan	1945-1955	Distributive Reform, land to tillers, abolishment of landlordism	Achieved	Achieved	Achieved	Successful. Gini Index of income distribution in local village and towns decreased from 0.45 to 0.55 in 1937 to 0.35 in 1955, productivity increased in household level, rapid economic growth started. SCAP initiated reform.	Ladejinsky (1960), Kawagoe (1999), Rashid (2000), Quizon (2005)
South Korea	1945–1950	Distributive Reform, land to tillers, abolishment of landlordism	Achieved	Achieved	Achieved	Successful. Almost same process of reform as in Japan. SCAP initiated reform.	Ban et al (1980), Quizon (2005), Wily et al (2008)
Taiwan	In 1950s	Distributive Reform, land to tillers, abolishment of landlordism	Achieved	Achieved	Achieved	Successful. The scheme was borrowed from Japanese reform, inequality decreased, production rose at annual rate of 5.6%. SCAP initiated reform.	Quizon (2005), Wily et al (2008)
India	1977- till date		Partially achieved in two states	Partially achieved in two states	Partially achieved in two states	Partially successful in West Bengal and Kerala but in other states not successful, still in process	Banerjee, Gertler and Ghatak (2002), Deininger, Jin & Nagarajan (2009)
Vietnam	1953–2002	Collectivized, de-collectivized, land to tillers	Achieved	Achieved	Partially achieved	Successful in Socialist setting, later decollectivized in 1988	Do and Iyer (2003), Rozelle and Swinnen (2004)
China	Mid 1950s-2008	Collectivized, de-collectivized, land to tillers	Achieved	Achieved	Partially achieved	Successful in Socialist setting, later decollectivized in 1970s and 1980s	Ping Li (2003), Rozelle and Swinnen (2004)
Nepal	1951-till date	Distributive reform, tenancy reform	Not achieved	Not achieved	Not achieved	Unsuccessful but issue is alive and process is continue	Regmi (1977), Quizon (2005), Wily et al (2008), Adhikari (2008)
Philippines	1960- 2003	Distributive reform, tenancy reform, land tax reform, community based reform	Not achieved	Not achieved	Not achieved	Though, some impacts on income but poverty continued and reform became unsuccessful, land administration was corrupted, process is continue	Quizon (2005), Reyes (2005)
Bolivia	Early 1950s-2011	Distributive Reform,	Partially achieved	Not achieved	Not achieved	Poor got land but the conflict rose between highland and lowland Bolivia, issue is alive and process is continue	Hertzler (2007), Wily et al (2008)
Kenya	Late 1950s-2008	Distributive Reform	Partially achieved	Not achieved	Not achieved	Conflict rose between Kikuyu and other communities, continue	Leach (1998), Wily et al (2008)
South Africa	1996-	Market based reform	Not Achieved	Not achieved	Not achieved	Failed because target did not meet, continue	Wily et al (2008), Aliber & Cousins (2013)
Zimbabwe	1980-	Distributive Reform	Not achieved	Not achieved	Not achieved	Failed because most of the beneficiaries were party cadres not the real landless people, continue	Hoogveen & Kinsey (2001), Wily et al (2008)
Chile	1964-1973	Distributive Reform	Partially achieved	Not achieved	Not Achieved	Only 5% peasants gained from reform	Bellisario (2007), Wily et al (2008)
Colombia	1994-	Market assisted reform	Not achieved	Not achieved	Not Achieved	Large plots of land taken by drug traffickers	Borras (2003), Wily et al (2008)
Mexico	1917, 1992	Collectively owned	Partially achieved	Partially achieved	Partially achieved	Rise in small forest enterprises, rising income	Wily et al (2008), Eakin, Bausch & Sweeney (2013)
Brazil	1930, 2010	People led reform, redistributive reform, market led reform	Not achieved	Not achieved	Not achieved	Failed because one percent of population still own half the total arable land	Borras (2003), Wily et al (2008)

Source: Compiled by Author

India has somehow successful experience of land reform implementation in West Bengal and Kerala in terms of equity, efficiency and economy. In these states, there were left-wing state governments at the time of implementation of land reform. In other states land reform implementation was not successful. At present, there is a vocal demand of land and landless people had long march for demanding land rights. Recently the government had drafted new land reform policy by reducing land ceiling but it is under discussion.

Moreover, Kenya and Bolivia have some positive impact on equity but other impacts are not significant. Mexico using collectively owned farm reforms could succeed in making small forest enterprises and increase income level of households and partially successful in reducing income inequalities and increasing productivity and growth. In Chile, it is partially successful in equity because only five percent peasants gained from reform. Most of other cases are mentioned as unsuccessful for achieving equity, efficiency and macro-economic growth. In some of the cases, land reform process is ongoing such as in Nepal and Bolivia.

2.6 Review of Literatures on Land Reform

David Ricardo's theory of rent is a famous theory in classical economics, which is related to land rent. Ricardo defines rent as a payment to the landlords for the use of the original and indestructible powers of the soil (1996, p.67). Economic rent, according to Ricardo, is the true surplus left after the expenses of cultivation as represented by payments to labor; capital and enterprise have been met. Land fertility varies with land quality and location and land management is more important for increasing productivity. Land management can be made effective with land reform initiative which has been introduced with the existence of the neo-classical theory.

There are many literatures in this field, which deal with different aspects of land and land reform. Some literatures deal with classic reforms, some with tenancy reform and some with technical efficiency aspects of reform. Among others, some deal with mix of two or all. Literatures are region specific or country specific as reform programs are bound to vary from country to country. Specific reform programs in any particular country need to be related to the problems presented by the agrarian structure and the social, economic and political background in which these problems are sought to be solved.

King (1974) states that land reform has mainly three motives- political, social and economic. The political motive is the balance of political power in a country which ultimately determines the extent of a reform, and the political factors help to explain the provisions of a reform law and their eventual practical effects. Many governments use land reform, or the promise of it, to gain or retain power.

The social motive is concerted on social equality or social justice, while the economic motive is based on the issue of efficiency. Moreover, the political motive is often considered as the last resort but the most decisive one. Sometimes, social motive and economic motive have trade off (i.e., conflict between equity and efficiency goal). Dorner (1972) explains that the conflict between distributive justice and economic efficiency is not the real issues. Conflicts only arise if the present ownerships structure of land and capital is assumed fixed.

However, Dorner (1972, 1992) and King (1977) stress that economic and social goals need not conflict. Indeed, they must be seen to be connected together in the land reform approach to development in general. Land reform in a traditional sense refers to redistribute land in favor of landless peasants and marginal farmers, which is the demand for greater equality or social justice. More importantly, land reform is a developmental implication and it can improve agricultural productivity and expend employment in an

economy. Banerjee (1999) argues that redistributive land reform may promote equity as well as efficiency. Moreover, redistribution should be based on a uniform land ceiling and not discriminate between different types of landlords. Agricultural extension programs and emergency income support programs should accompany land reform programs. He further argues that market-assisted land reforms and tenancy reforms are possible alternative strategies. Kawagoe (1999) studied the land reform in Japan and identified the features of reform, reasons for success. Besley & Burgess (2000); Banerjee, Gertler & Ghatak (2002); Bardhan & Mookherjee (2010) studied about the different aspects of land reform in India. They mentioned that land reform can reduce poverty and inequality and also increase tenants' security. Lipton (2010) is one of the most recent and detailed literatures in this field, which includes the theories, practices, empirics and evidences of land reform in different countries. In conclusion, of this book, Professor Lipton argues that land reform issues are never dead; they are alive issues in developing countries because poverty issues are not solved yet.

There are some literatures in Nepalese case too. Regmi (1977) is the pioneering study about land reform in Nepal. He mentioned that the 1964 initiative of land reform was good start but the implementation was weaker due to the influence of elite forces. Shrestha (1990) also agreed that Nepalese land reform lacked implementation. Wily et al (2008) studied about the historical approach of land reform in Nepal. They mentioned that implementation of land reform policy is the weak point of land reform in Nepal. Similarly, Adhikari and Bjorndal (2009), Adhikari (2008), Community Self Reliance Center (2009), Bhandari and Lirngam (2010), Thapa (2007) agree that Nepalese land reform policies are good in paper but they are not implemented properly. If land reform were implemented successfully, the scenario of land distribution, income and consumption pattern of households would be different.

However, in case of Nepal, Adhikari and Bjorndal (2009) studied the land reform issues empirically from equity perspectives. Using household level survey data from Nepal living standard survey 2003/04, they found that land reform increases consumption and income of poor households and reduces poverty and inequality. They made this conclusion by finding positive relationship between household land size and household consumption and income. But in their study they did not evaluate the impact of land reform implementation. Moreover, Adhikari and Bjorndal (2012) also studied about the technical efficiency of Nepalese farmers. In this study too they used the same data as in their former study as mentioned above, used translog production function and identified that Nepalese agriculture has efficiency gap of about 28 percent. However, in their study, they did not identify the beyond ceiling land in their study. They also did not link their study with land reform in Nepal.

Most of the other studies mentioned above in Nepalese cases are descriptive. Furthermore, these studies did not empirically evaluate the implementation of land reform in Nepal. Evaluation of possible implementation of policy is very important because it will give clear pictures to the policy maker about the impact of policy. Empirical study about impact of implementation of land reform on equity, efficiency and macro-economy not only gives good information for future policies but also suggests the policy makers that which policy options have more benefits to achieve these goals. Therefore, in this research, the impact of implementation of land reform policy on equity, efficiency and macro-economy of Nepal from micro as well as macro perspectives is evaluated and compared as well.

To study from micro perspectives, latest Nepal living standard survey 2010/11 data, welfare function for distributive reform and Cobb-Douglas production frontier function and data envelopment analysis for productivity augmenting reform are used. Moreover, as

the part of this research work, input-output (IO) table and social accounting matrix (SAM) of Nepal for 2010/11 are estimated in this study. Since there is no authentic IO table and SAM for Nepal published by government agency, estimation of fresh IO table and SAM has great importance for Nepal. Then using the results of micro studies of chapter three and chapter four, the economy-wide impacts of land reform using IO and SAM framework are studied. Furthermore, in chapter five and in the appendix of chapter five, the micro-simulation impacts of land reform in macro-economy of Nepal are evaluated using both SAM (in chapter five) and IO framework (in appendix 5A). So far as in knowledge, this type of study is novel in literature as well as in case of Nepal and has great significance.

3. An Equity Approach of Land Reform

3.1 Introduction

Land reform in Nepal has been one of the hot issues in political and economic sphere for more than five decades. The main cause of political and social conflict is deeply rooted in the unequal distribution of land. The dispute between landlords and tenants remains unsolved for many years; which hinders not only the modernization of agricultural sector but also the economic development of Nepal. Due to the lack of strong implementation of reform, the economic problems of the country remain the same especially in agricultural sector. According to Central Bureau of Statistics (2012), Nepal is one of the least developed countries with 26.6 million people among which 85.8 percent of them live in the rural areas. Agriculture is the mainstay of the economy accounting for one third of GDP. The economic growth rate has been around 4 percent on average for a decade with one third of total population under absolute poverty level. The Gini coefficient of land distribution is 0.57 with highly skewed land distribution. The average size of agricultural land is 0.7 hectares in 2010/11 (Central Bureau of Statistics, 2011a) which was 0.8 hectares in 2003/04, 1.1 hectares in 1995/96 and 1.7 hectares in 1964. The increased population had much pressure on agricultural land resulting land fragmentation and decreased size over time. Since land reform is a vital component of overall agricultural development, the country needs to focus this issue first.

The land reform process of Nepal was initiated in 1951 after the abolishment of 104 years long *Rana* regime. The comprehensive land legislation of 1964 (Nepal Law Commission, 2012) was good base for land reform under the King *Mahendra's* rule. However, it was good in paper, land reform could not take place due to lack of implementation. Many other attempts were made, but the progress was almost nothing

indicating failed reforms. The 1964 Act has been amended time to time. The Fifth Amendment to the 1964 Land Related Act was done in 2002 (FALRA 2002) that drastically reduced land ceiling in Nepal. This legislation provides the land reform policy for the country. The major land reform policies are promoting security of tenants and transferring ownership by means of redistribution of land. In this section, focus is given to the redistributive land reform policy.

Even FALRA 2002 was not properly implemented indicating failed reform on land. The scenario of land distribution would be different if the land ceilings of FALRA 2002 were properly implemented. Therefore, the main purpose of this study is to evaluate land reform policy in Nepal making a simulation of redistribution of land based on provision of FALRA 2002 and see the impact of land reform on equity and household welfare.

What is the role of land reform to reduce poverty and inequality in Nepal? This is the main research question, which needs to get reply during the course of this study. To search for its answer, our objective is to explore the link between poverty (or inequality) and own land holding size. Based on simulation of land redistribution policy, focus is given to study about how land reform can play a vital role to reduce poverty and inequality in the country. The main hypothesis to be tested here is that the larger the access to land for poor, the larger the income and consumption thereby reducing poverty and inequality in Nepal.

3.2 Relevant Literatures

Land reform can be the foundation stone for modernization of agricultural sector in developing countries by reducing disputes between landlords and tenants. Land being as one of the main factors of production, land reform issues could draw attention of many scholars and researchers. Among others, some researchers focused on redistribution of land. Besley and Burgess (2000), argue that land reform in developing countries are aimed at improving

the poor's access to land but their effectiveness has often been hindered by political constraints on implementation. They further mentioned that land reform is associated with poverty reduction. Carter (2003), de Janvry et al. (2001), Deininger (2003) also discussed the improved access to land for poor and found that land reform is positively related to the income of poor by reducing their poverty level. Binswanger et. al. (1995) also agreed that redistributive land reform policy is not only important for poverty alleviation but also for socio-economic development. Land reform has wider range of benefits for poor by increasing their welfare.

Turning to Nepalese case, most of the studies regarding to land reform focus on the increase in land productivity, tenancy right, and security of tenants and redistribution of land (Adhikari, 2008; Neupane, 2011 and Regmi, 1977). For example, according to a study conducted by Community Self Reliance Center (2009), without land reform, there will be no investment in farming technology, no improvement in agricultural productivity and no evolution from subsistence farming to surplus farming. Land reform leading to improved agricultural productivity will stimulate the economy as a whole by creating employment, producing raw materials for other industries and reducing social unrest.

From the viewpoint of poverty reduction, the study of Adhikari & Bjorndal (2009) is important in Nepalese context. Using Nepal Living Standard Survey II data, they specified generalized additive model (GAM), estimated household income and consumption functions, checked the significance of own land size coefficient and argued that greater access to land for the poor reduces poverty. They further mentioned that an effective land reform policy could well be the most effective approach to alleviate poverty but their study neither considered the income or consumption inequality nor evaluated the land reform policy in Nepal. To the best of our knowledge, there is no simulation study evaluating the impact of

land reform policy on per capita income and per capita consumption inequality using FALRA 2002 policy.

3.3 Research Methods

3.3.1 Data

The principal data source is Nepal Living Standard Survey 2010/11 (Central Bureau of Statistics, 2011a) which is a household survey conducted by the Government of Nepal in 2010/2011¹. The data set contains wide range of information of sample households such as demographic characteristics of head and other members, housing, access to facilities, literacy and education, health services, maternity and family planning, migration and absentees, agriculture, consumption, income, employment status, farm and non-farm activities, remittances and transfer income, borrowing and loans, consumption adequacy, facility provided by the government, nutrition of children, etc.

Agriculture further includes information about farming and livestock. Farming includes landholding (land owned and rental arrangements), increase and decrease in holding by land buying and selling, agricultural production and use of inputs, expenditure and earning from agriculture, ownership of livestock and farming assets and extension services.

The data is used with the permission of Central Bureau of Statistics, Government of Nepal. This is a latest survey conducted following the Living Standard Measurement Survey (LSMS) methodology developed and promoted by the World Bank and is representative of the whole country, five-development regions-eastern, central, western, mid-western and far western region and 75 administrative districts. The survey enumerated 5,988 sample

¹ This survey was conducted with the technical support of World Bank using Living Standard Measurement Survey methodology.

households from 499 primary sampling units (PSUs) such as wards or sub-wards over 3 ecological zones, 5 development regions, 75 districts, 58 municipalities and 3,914 Village Development Committees.

This cross section sample covers information from 34,344 individuals living in 5,988 households in the country. This data collection was done in two stages using probability proportional to size (PPS) sampling method. Among 5,988 households level information, the adjusted sample size is 4,560 households.

In this study, for estimation of poverty, consumption based national poverty line calculated by Central Bureau of Statistics (CBS); the Government of Nepal is used. According to Central Bureau of Statistics (2011b), the national poverty line for Nepal is Nepalese Rupees (NPR) 19,261.18, which is based on Cost of Basic Needs approach (CBN). In this approach, the poverty line can be defined as the expenditure value (in local currency) required by an individual to fulfill his/her basic needs in terms of both food and non-food items. While the poverty line in the previous round of the survey in 2003/04 was an update of prices for the same basic needs basket estimated in 1995/96, the poverty line for 2010/11 is based on a new basic needs basket of the poor to reflect changes in well-being over time.

3.3.2 Model

3.3.2.1 Welfare Function

The welfare functions (per capita income and per capita consumption) as specified in equation 3.1 are estimated in this chapter. In equation 3.1, Y is measure of per capita welfare (consumption or income), X is vector of control variables (see Table 3.1 for detail), Z is the variable of interest which is used as policy variable in simulation (household own land holding size here), α is constant term, β is a vector of parameters, γ is coefficient of land holding, and ε is error term.

$$(3.1) \quad Y = \alpha + \beta X + \gamma Z + \varepsilon$$

Moreover, dependent and policy variables are specified in the form of natural log. To know the impact of household own land holding size and variation of land holding by regions, the policy variable is further interacted with regional dummies and household category dummies. Based on household own land size, the households are categorized as-landless, marginal, small, medium and large and their definition and explanation is presented in table 2.5 in previous chapter. The regional dummies are-Terai, Kathmandu Valley and other regions (Hills and Mountains).

Due to the land reform program of FALRA 2002, the land holding size will change because of imposition of land ceiling. After the ceiling applies, the Government acquires the excess land beyond ceiling and distributes this surplus land to the landless and marginal farmers. To know the impact of FALRA 2002, estimation results of equation (3.1) together with the adjusted land size due to the effect of land ceiling policy are used. For this, per capita income and consumption functions are estimated, value of per capita income and consumption are predicted, the per capita income and consumption with adjusted land size after distribution of land beyond ceiling are calibrated, and then results before and after land reform are compared. Moreover, poverty and inequality indices before and after land reform simulation are also compared.

3.3.2.2 Measures of Poverty

For the analysis of poverty, Foster-Greer-Thorbecke (FGT) poverty measures named as head count ratio (P0), poverty gap (P1) and severity of poverty (P2) are used. The FGT poverty measures are defined as:

$$(3.2) \quad P_\alpha = \int_0^z \left(\frac{Z-Y}{Z} \right)^\alpha f(Y) dY \quad \& \quad \alpha \geq 0$$

Where, Y is the household per capita consumption expenditure, $f(Y)$ is its density (roughly the proportion of the population consuming Y), Z denotes the poverty line, and α is a non-negative parameter. For Nepal, national poverty line based on per capita consumption is 19,261.18 Nepalese Rupees. Higher values of the parameter α indicate greater sensitivity of the poverty measure to inequality among the poor. The poverty measures P_s for $\alpha = 0, 1,$ and 2 , which respectively defines the head-count index, the poverty gap index, and the squared poverty gap index are estimated.

3.3.2.3 Measures of Inequality

The three measures of inequality named as Gini coefficient, Theil index and coefficient of variation are used here. These three measures satisfy all the four properties of complete measure of inequality (anonymity principle, population principle, relative income principle and Dalton principle). The three measures are defined as:

$$(3.3) \quad \text{Coefficient of Variation (C)} = \sqrt{\sum_{g=1}^m \frac{n_g}{N} \left(\frac{Y_g - \mu}{\mu} \right)^2}$$

$$(3.4) \quad \text{Gini Coefficient (G)} = \frac{1}{2n^2 \mu} \sum_{j=1}^m \sum_{k=1}^m n_j n_k |Y_j - Y_k|$$

$$(3.5) \quad \text{Theil Index (T)} = \frac{1}{N \mu} \sum_{g=1}^m Y_g \ln(Y_g / \mu)$$

Where, N is the number of households in population, m is income groups, Y_g is representative income for group g and could be mean income, and $\mu = \frac{1}{N} \sum_{g=1}^m Y_g$.

3.4 Estimation Results

Table 3.1 shows summary statistics of variables used in the estimation. Average per capita income is less than average per capita consumption but income has more variation.

Table 3. 1: Summary Statistics

Variables	Mean	Std. Dev.	Min.	Max.
Dependent Variables (Y)				
Per capita income (Rupees)	25,431.42	78,076.74	451.77	3,163,921.00
Per capita consumption (Rupees)	26,943.16	23,472.21	3,361.98	358,886.00
Policy variable (Z)				
Household own land size(ha)	0.59	1.01	0.002	24.40
Control variables(X)				
Characteristics of household				
Age of household head (years)	47.11	13.98	11.00	95.00
Household head female (yes=1)	0.26	0.44	0.00	1.00
Education of head (in Years)	2.91	2.41	0.00	17.00
Chronic illness of head (yes=1)	0.14	0.35	0.00	1.00
Household size	4.98	2.36	1.00	20.00
Dependency ratio (%)	95.48	93.43	0.00	700.00
Earning age (15-59 years) (yes=1)	0.79	0.41	0.00	1.00
Land Holding Category (dummies)				
Land less	0.10	0.29	0.00	1.00
Marginal	0.22	0.41	0.00	1.00
Small	0.56	0.49	0.00	1.00
Medium	0.10	0.30	0.00	1.00
Large (beyond limit)	0.02	0.07	0.00	1.00
Regions (dummies)				
Terai	0.43	0.50	0.00	1.00
Kathmandu Vally	0.04	0.20	0.00	1.00
All other regions	0.53	0.50	0.00	1.00
Hills	0.45	0.50	0.00	1.00
Mountains	0.08	0.27	0.00	1.00
Distance to Facilities (hours)				
Distance to Motorable Road	2.23	7.65	0.00	72.00
Distance to Primary School	0.09	0.97	0.00	50.50
Distance to Health Center	0.24	2.04	0.00	72.00
Ethnicity Dummies				
Brahman Chhetri	0.35	0.48	0.00	1.00
Madheshi	0.09	0.28	0.00	1.00
Janajati	0.28	0.45	0.00	1.00
Dalits	0.13	0.33	0.00	1.00
Newar	0.06	0.24	0.00	1.00
Others	0.09	0.29	0.00	1.00

Note: The number of the observations is 4,560

Source: Author's Estimation

Average household own land holding size is 0.59 hectares ranging from minimum of 0.002 hectares² to maximum of 24.40 hectares. Average age of household head is 47.11

² In the estimation of welfare functions (per capita income and consumption functions), the log of land size is used. Since log of zero has no meaning, those landless households that have zero land are excluded from the estimation. This may create some biasness in the estimation. However, while distributing the surplus land, all of the landless households (including those with no land) are considered.

years, 26% of households are headed by female, mean education level of head is 2.91 years, 14% of head are suffering from chronic illness (such as heart diseases, diabetics, etc.), average household size is 4.98 persons per household, average dependency ratio (ratio of persons in non-working age to working age) is 95.48%, in average 79% of head are in earning age (15 to 59 years). Similarly, 10% households are landless, 22% are marginal, 56% are small, 10% are medium and 2% are large³.

Furthermore, 43% households are from Terai, 4% are from Kathmandu Valley and 53% are from other regions (among them 45% are from Hills and 8% are from Mountains). Average hours taken from household to motorable road is 2.23 hours, to primary school is 0.09 hours and to health center is 0.24 hours. Since there are vast different ethnicities in Nepal, they are broadly divided into 6 ethnicities. The ethnicity of 35% of households is *Brahmin Chhetri*, 9% is *Madheshi*, 28% is *Janajati*, 13% is *Dalits*, 6% is *Newar* and rest 9% from others ethnicities.

3.4.1 Estimation of Per Capita Income Function

Table 3.2 shows Ordinary Least Square (OLS) estimation of per capita income with heteroskedasticity robust standard errors. Since in our sample data set; the large households have large size of household own land. For land reform, they are very important and we cannot exclude them from sample. To overcome this problem heteroskedasticity robust standard errors are used.

Estimation results in table 3.2 shows that per capita income is significantly positive with household own land size, age of household head, education of head, earning age (15-59 years) and the interaction term of land holding with Terai and Kathmandu, ethnicity of

³ Since the sample dataset has less large households (about 2%) than the actual (about 3%), there may arise some bias due to the less representativeness of data. To overcome this issue, the household weight is used in the estimation.

Brahmin Chhetri, Janajatis and Newar but it is significantly negative with variables household head female, household size, dependency ratio, landless, marginal and medium households, Kathmandu Valley, ethnicity of *Madheshi* and *Dalits*. Other variables are found insignificant.

The effect of household own land size on per capita income is different based on the regions and the size of the land holding categories. This means that in general, per capita income does not have constant elasticity for all regions and all categories of holding. For Terai and Kathmandu, per capita income is increasing with household own land size in reference to others region. This is the variable of our interest as policy variable and the result is as expected. The implication of this is-if poor farmers get access to more land, their income would be increased reducing their poverty level. If the age is earning age, the per capita income increases. Higher the age of household head, more is the per capita income. Increase in household head's education level is associated with more per capita income but if the household head is female, size and the dependency ratio in household is larger, per capita income reduces.

Others region is used here as reference category for regions. Therefore, those having own land in Terai and Kathmandu region have more per capita income than those in others region (Hills and Mountains). Similarly, persons with landless, marginal and medium holdings have less income compared to those with small land holdings while persons with large land holdings are insignificant.

Additionally, with ethnicity of *Brahmin Chhetri, Janajitis* and *Newar*, per capita income increases compared to others but with ethnicity *Madheshi and Dalits*, per capita income decreases. In Kathmandu Valley, lands are more productive than in other regions and accordingly per capita income is also more. Similarly, people with ethnicity of

Madheshi marginalized and *Dalits* are the ethnic groups, which are historically excluded from mainstream; they are less engaged in official jobs and getting less income.

Table 3. 2: Estimation of Income Function⁴

Dependent variable: log per capita income

Variable	Coefficient	t-value	Variable	Coefficient	t-value
Policy variable			Distance to Facilities (hours)		
log of HH own land size	0.17	4.33 ***	Distance to Motorable Road	0.00	1.46
<u>Interaction with regions</u>			Distance to Primary School	-0.13	-0.44
log of HH own land size*Terai	0.07	3.67 ***	Distance to Health Center	0.03	0.47
log of HH own land size*Kathmandu	0.22	3.52 ***	Regions (dummies)		
log of HH own land size*Others	....		Terai	0.16	1.65
<u>Interaction with holding categories</u>			Kathmandu Valley	1.06	6.66 ***
log of HH own land size*landless	-0.23	-4.00 ***	Other Regions	....
log of HH own land size*marginal	-0.32	-5.89 ***	Ethnicity (dummies)		
log of HH own land size*small	....		Brahmin Chhetri	0.22	3.62 ***
log of HH own land size*medium	0.41	3.66 ***	Madheshi Marginalized	-0.10	-2.45 **
log of HH own land size*large	0.80	2.36 **	Janajatis	0.03	2.89 **
Characteristics of HH			Dalits	-0.05	-2.54 **
Age of HH head (years)	0.01	2.27 **	Newar	0.27	3.01 ***
HH head female (yes=1)	-0.11	-2.93 **	Others	....
Education of head (in Years)	0.20	7.00 ***	Constants		
Chronic illness of HH head (yes=1)	-0.34	-1.35		10.72	71.30 ***
HH size	-0.16	-5.42 ***	F(28, 4531)	39.57	
HH dependency ratio (in %)	-0.002	-7.09 ***	R-Squared	0.20	
Earning age (15-59 years) (yes=1)	0.41	5.43 ***	Number of observations	4560	
Land Holding Category (dummies)					
Land less	-0.51	-2.46 **			
Marginal	-0.58	-5.13 ***			
Small	.....			
Medium	-0.78	-8.94 ***			
Large (beyond limit)	0.45	0.55			

Note: *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Source: Author's Estimation

3.4.2 Estimation of Per Capita Consumption Function

Table 3.3 shows OLS estimation of per capita consumption function with heteroskedasticity robust standard errors. The estimation results show that per capita consumption is significantly positive with household own land size, age of household head,

⁴ To overcome heteroskedasticity, heteroskedasticity robust standard errors are used while estimating the income function in table 3.2 and consumption function in table 3.3. Even if we exclude large households from the sample, the estimated coefficients almost remain the same because the large households are few in the sample.

education of head, chronic illness of head, Terai, Kathmandu Valley, ethnicity *Brahmin Chhetri* and *Newar*. However, it is significantly negative with household size, dependency ratio, landless and marginal land holding, distance to motorable road, distance to primary school. It is insignificant with other variables.

Table 3. 3: Estimation of Consumption Function

Dependent variable: log per capita consumption					
Variable	Coefficient	t-value	Variable	Coefficient	t-value
Policy variable			Distance to Facilities (hours)		
log of HH own land size	0.12	6.00 ***	Distance to Motorable Road	-0.01	-8.53 ***
<u>Interaction with regions</u>			Distance to Primary School	-0.02	-2.29 **
log of HH own land size*Terai	0.02	1.95 *	Distance to Health Center	-0.01	-1.45
log of HH own land size*Kathmandu	0.08	2.51 **	Regions (dummies)		
log of HH own land size*Others	....		Terai	0.15	6.15 ***
<u>Interaction with holding categories</u>			Kathmandu Valley	0.70	8.66 ***
log of HH own land size*landless	-0.02	-2.45 **	Other Regions	....
log of HH own land size*marginal	-0.20	-7.22 ***	Ethnicity (dummies)		
log of HH own land size*small	....		Brahmin Chhetri	0.24	8.11 ***
log of HH own land size*medium	0.26	4.58 ***	Madheshi Marginalized	-0.02	-0.61
log of HH own land size*large	0.49	2.83 **	Janajatis	0.05	1.54
Characteristics of HH			Dalits	-0.06	-1.81 *
Age of HH head (years)	0.00	1.78 *	Newar	0.42	9.14 ***
HH head female (yes=1)	-0.05	-0.65	Others		
Education of head (in Years)	0.06	4.76 ***	Constants	10.28	135.74 ***
Chronic illness of HH head (yes=1)	0.07	3.15 ***	F(28, 4531)	89.29	
HH size	-0.08	-22.19 ***	R-Squared	0.36	
HH dependency ratio (in %)	0.00	-11.23 ***	Number of observations	4560	
Earning age (15-59 years) (yes=1)	0.05	1.51			
Land Holding Category (dummies)					
Land less	-0.40	2.26 **			
Marginal	-0.38	-6.66 ***			
Small	....			
Medium	-0.72	-1.07			
Large (beyond limit)	0.68	1.80 *			

Note: *** Significant at 1% level, ** Significant at 5% level, * Significant at 10% level

Source: Author's Estimation

Different from per capita income estimation, per capita consumption is not significant with female-headed households and earning age. The interaction dummies with household own land size show that per capita consumption increases with the land holding

in Terai and Kathmandu compared to other regions. Compared to the small sized land holding, per capita consumption decreases with landless and marginal holding but increases with medium and large holdings.

Referring the estimation results, we can explain that the effect of household own land size on per capita consumption is different according to the regions and household categories. In general, per capita consumption has not constant elasticity for all regions and all categories of holding. As household land size is a policy variable of our interest and the result is as expected; the implication of this is-if poor farmers get access to more land, their per capita consumption level would be increased helping to reduce poverty level but it is not alike for all the regions. Higher the age of household head, more is the per capita consumption. When household size and dependency ratio increase per capita consumption decreases but the higher education level of household head increases per capita consumption.

Similarly, the longer the distance to motorable road and primary school, per capita consumption decreases. Per capita consumption is higher in Terai and Kathmandu in comparison to other region. People with ethnicity of *Brahmin Chhetri* and *Newar* have more per capita consumption than those with other ethnicity because these ethnic people generate more income from employment in government and private institutions as well as business activities and consume more. Moreover, *Dalits* are historically deprived ethnic people with low ranking in *Hindu* hierarchical caste system and they have less income and consume less than others consume.

3.5 Land Size and Income Consumption Relationship

As explained in previous section, it is found that land size and income or consumption has positive relationship (see figure 3.1 and 3.2). In developing countries like that of Nepal,

household own land is an important asset. People with more land have not only more income or consumption but also more power in society, higher living standard, more confidence for risk coping and more exercise of capability and freedom.

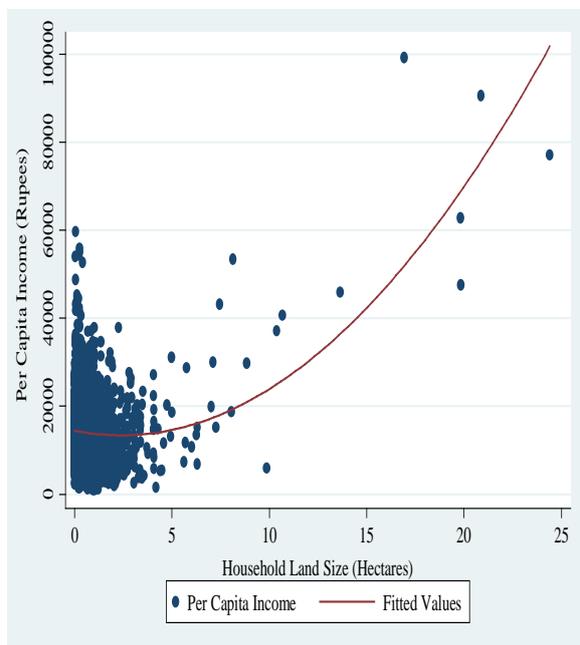


Figure 3. 1: Land Size and Income

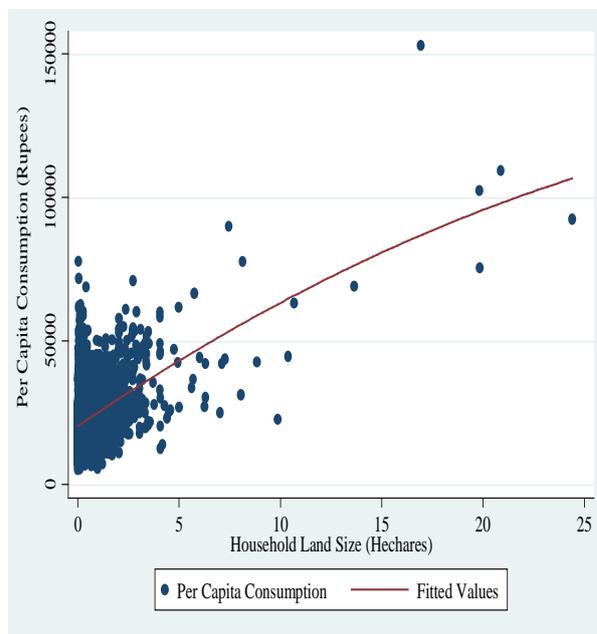


Figure 3. 2: Land Size and Consumption

Comparing figure 3.1 and figure 3.2, we see that the trend line of per capita household income is increasing with household own land size at faster rate but that of per capita household consumption is increasing at slower rate with household own land size. This is because consumption does not rise as the same proportion with income.

3.6 Simulation based Evaluation of Land Reform

3.6.1 Land Reform and Welfare Changes

Table 3.4 shows the simulation results. If the land ceiling policy set by FALRA 2002 were implemented, the scenario would be as presented in table 3.4. In this table, results are shown for three regions with three categories of household land holding. Household own land-holding size, per capita income and per capita consumption are calculated and compared before and after land reform. In each region, the land holding of large households

is reduced to its permitted ceiling and it is distributed to the landless and marginal tenants' households.

Land act has determined the maximum land limit that each household can keep across region where the household landholding is located. This limit includes the homestead land too. The total surplus land beyond the ceiling is calculated and then reduced the surplus land of large households from total household owned land to the land that has been permitted by ceiling policy. Similarly, the unused land of absentee landlords is also included in land reform process assuming that after land reform all of the unused land and left fallow land will come under operation.

The total amount of surplus land is determined and according to the land act, the government acquires it. After identification of proper beneficiaries, the government makes the final database of the households who will get this surplus land. After deciding how much and which land is to be distributed to which landless or marginal tenants, the government needs to pass it by executive body before implementation. Then making necessary legal arrangements, it is distributed among the landless and marginal tenant farmers⁵ within the region.

The current land act has provision to pay compensation to landlords, which states that the government of Nepal will provide the landowner with an amount of compensation at the prescribed rate for acquisition of land in excess of upper ceiling. However, current land law has provision of compensation, the possible recipients (landless and marginal tenants) and some of the political parties of Nepal (especially the left wings) have demanded that the land must be acquired by the government without compensation to the landlords and should distribute to the beneficiaries. Compensation is more debated issue in Nepal and the current

⁵ The landless and marginal tenants who are cultivating the lands of large households (beyond ceiling lands) at the time of redistribution of land must be given priority to acquire land. As they have family labors, they would cultivate the redistributed land with more incentive as the land title comes under their names.

land law does not clearly mention about the amount of compensation rather states “compensation at the prescribed rate”. Furthermore, in this process of acquisition of surplus land, the government needs to decide either to pay or not to pay compensation⁶. If the government decides not to pay compensation, it needs to amend the land law from the parliament. Additionally, if the government decides to pay minimum level of compensation, it needs to pass the amount from the executive body.

In this simulation the landless and marginal farmers are identified from their household own land status that they had self-reported in the time of survey. However, there might be self-selection bias if the survey were conducted for land distribution purpose. This survey was for measuring living standard and socio-economic status; therefore it is assumed that self- selection bias is not present in this survey.

In sample data set, it is found that there is 198.96 hectares of land, which is beyond the land ceiling that FALRA 2002 permits. While making simulation in land size, this excess land is distributed to the landless and marginal farmers who have less than 0.15 hectares of land in Terai, less than 0.04 hectares of land in Kathmandu Valley and less than 0.08 hectares of land in other regions (Hills and Mountains). This criterion for the landless and marginal tenant farmers who are eligible to get land is based on the proportion of land ceiling defined by FALRA 2002. Such households are 1128 in our sample (326 households in Terai, 8 households in Kathmandu Valley and 794 households in other regions). Land is distributed to each landless and marginal tenants households, which are eligible to acquire land based on the regional proportion in the same manner as referred by FALRA 2002 (Nepal Law Commission, 2012).

⁶ For simplicity, the effect of compensation is not considered in this research because the current land law does not mention the amount of compensation stating that the Government of Nepal will provide the landowner with an amount of compensation at the prescribed rate for acquisition of land in excess of upper ceiling. However, it is not clear that what the “prescribed rate” means. The authority needs to explain the term clearly by making rules or sister laws. Since private land is not redistributed yet in Nepal using the current law, the term “prescribed rate” remained unexplained.

Table 3. 4: Land Own Size Before and After Reform (in Hectares)

Variable	Before Land Reform				After Land Reform				% Change in Mean Value
	mean	st. dev.	min	max	mean	st. dev.	min	max	
Total	0.59	1.02	0.002	24.40	0.59	0.72	0.05	7.45	0.00
Terai	0.64	1.35	0.01	24.40	0.64	0.89	0.12	7.45	0.00
Landless	0.01	0.03	0.01	0.02	0.12	0.00	0.12	0.13	711.07
Marginal	0.15	0.08	0.02	0.30	0.22	0.05	0.13	0.30	52.61
Small	0.74	0.39	0.30	2.00	0.74	0.39	0.30	2.00	0.00
Medium	3.04	1.15	2.02	7.45	3.04	1.15	2.02	7.45	0.00
Large	16.02	5.68	8.14	24.40	7.45	0.00	7.45	7.45	-53.48
Kathmandu	0.24	0.30	0.002	2.26	0.24	0.26	0.05	1.52	0.00
Landless	0.001	0.00	0.002	0.003	0.05	0.00	0.05	0.05	4118.49
Marginal	0.05	0.01	0.03	0.06	0.06	0.02	0.05	0.10	33.23
Small	0.17	0.09	0.06	0.41	0.17	0.09	0.06	0.41	0.00
Medium	0.71	0.29	0.43	1.52	0.71	0.29	0.43	1.37	0.00
Large	2.26	0.00	2.26	2.26	1.52	0.00	1.52	1.52	-32.86
Other regions	0.57	0.66	0.01	10.38	0.57	0.54	0.08	3.81	0.00
Landless	0.01	0.00	0.01	0.02	0.08	0.00	0.08	0.09	453.29
Marginal	0.08	0.04	0.02	0.15	0.12	0.02	0.08	0.16	47.49
Small	0.47	0.23	0.15	1.02	0.47	0.23	0.15	1.02	0.00
Medium	1.57	0.52	1.02	3.81	1.57	0.52	1.02	3.76	0.00
Large	6.14	2.15	4.07	10.38	3.81	0.00	3.81	3.81	-37.97

Source: Author's Estimation

However, in reality, proper identification of rural landless people using current information is a great challenge. The identification of who are the exact possible beneficiaries is the most important part to be done before implementation of redistributive policy. Moreover, this can be done with the help of local communities which will help in the screening of fake landless, landless recommended by some political parties with their vested political interest and so on and lessen the chances of adverse selection.

Moreover, all of the landless people are not poor, especially the landless people in urban areas have no land but they have their own business or income earning from employment. Therefore, for the land distribution purpose, properly identification of poor rural landless people who want to cultivate the land but do not have land is a more challenge for implementing authorities. The urban non-poor landless should be excluded from redistribution of land because they are not the targeted groups from this policy. The priority

of land distribution should be given to the poor landless tenants who are tilling the landlords land as current tenants.

Table 3. 5: Per Capita Income Before and After Reform (in Rupees)

Variable	Before Land Reform				After Land Reform				% Change in Mean Value
	mean	st. dev.	min	max	mean	st. dev.	min	max	
Total	14,183.71	6,921.78	888.87	99,324.67	14,732.46	6,424.31	1,132.14	86,512.97	3.87
Terai	13,218.22	6,698.13	888.87	99,324.67	14,587.43	6,323.93	1,132.14	86,512.97	10.36
Land less	10,385.53	5,726.30	888.87	28,893.99	13,524.64	4,773.23	1,132.14	32,769.41	30.23
Marginal	13,323.44	5,038.33	1,366.63	30,005.14	13,806.40	4,190.49	1,409.90	34,463.72	3.62
Small	14,184.81	6,177.81	1,388.50	36,994.10	14,184.81	6,177.81	1,388.50	36,994.10	0.00
Medium	16,194.70	6,900.69	1,555.21	43,276.77	16,194.70	6,900.69	1,555.21	43,276.77	0.00
Large	58,184.40	28,377.10	5,980.89	99,324.67	51,006.29	23,341.02	5,889.32	86,512.97	-12.34
Kathmandu	27,705.75	10,697.94	9,215.29	59,648.79	28,801.13	9,899.96	10,174.42	55,901.25	3.95
Land less	13,057.01	5,521.96	9,215.29	14,349.73	17,076.53	4,365.87	10,174.42	26,351.30	30.78
Marginal	15,575.31	11,320.83	13,211.65	59,648.79	17,636.67	9,074.61	13,405.33	64,231.65	13.23
Small	29,562.46	9,452.87	14,522.67	55,901.25	29,562.46	9,452.87	14,522.67	55,901.25	0.00
Medium	32,228.16	5,234.12	15,813.44	26,387.00	32,228.16	5,234.12	15,813.44	26,387.00	0.00
Large	37,904.85	0.00	37,904.85	37,904.85	35,448.11	0.00	35,448.11	35,448.11	-6.48
Other regions	14,202.91	5,951.56	1,363.38	37,834.50	14,536.16	5,549.76	1,606.65	37,834.50	2.35
Land less	11,160.35	5,752.44	1,363.38	29,638.80	13,639.61	5,170.41	1,606.65	34,306.62	22.21
Marginal	12,822.24	5,427.54	1,940.71	35,622.37	13,808.80	4,487.74	2,217.78	47,129.32	7.69
Small	18,993.43	5,925.43	2,471.59	37,834.50	18,993.43	5,925.43	2,471.59	37,834.50	0.00
Medium	29,840.87	4,385.05	5,363.38	27,580.28	29,840.87	4,385.05	5,363.38	27,580.28	0.00
Large	38,972.10	9,337.54	5,771.53	37,164.50	32,464.97	7,451.12	4,812.09	31,399.39	-16.70

Source: Author's Estimation

After redistribution of land, the average land holding size does not change because the total land is the same in quantity but the distribution pattern changes. The important issue to be mentioned here is that in each region, the land size of landless and marginal farmers increases and the land size of large farmers decreases while the land size of small and medium farmers remains constant. This is because farmers with small and medium land-holding categories that have their own land within permitted ceiling are unaffected by the land reform policy.

Table 3. 6: Per Capita Consumption Before and After Reform (in Rupees)

Variable	Before Land Reform				After Land Reform				% Change in Mean Value
	mean	st. dev.	min	max	mean	st. dev.	min	max	
Total	22,993.26	9,176.92	5,327.76	153,023.40	23,712.25	8,939.35	5,417.78	139,061.90	3.13
Terai	22,759.06	9,977.14	5,327.76	153,023.40	25,579.72	9,285.28	5,732.36	139,061.90	12.39
Land less	14,271.02	4,919.76	5,327.76	47,310.58	20,152.00	3,933.68	11,191.75	61,579.64	41.21
Marginal	20,959.91	5,672.22	7,108.70	38,379.90	22,651.56	4,686.10	7,108.70	48,386.12	8.07
Small	24,582.19	7,369.91	5,732.36	50,005.88	24,582.19	7,369.91	5,732.36	50,005.88	0.00
Medium	37,733.98	13,336.12	11,214.67	90,095.42	37,733.98	13,336.12	11,214.67	90,095.42	0.00
Large	85,150.67	35,899.98	22,879.47	153,023.40	77,781.00	31,611.90	22,145.83	139,061.90	-8.65
Kathmandu	42,697.39	10,541.09	15,729.24	77,590.86	43,508.30	10,263.45	19,568.58	68,844.63	1.90
Land less	22,723.42	4,880.75	15,729.24	27,091.54	32,264.37	4,292.72	29,947.77	41,581.08	41.99
Marginal	26,989.25	12,332.86	22,188.36	47,590.86	34,491.56	12,124.96	23,188.36	55,545.27	27.80
Small	33,079.12	9,545.44	19,568.58	68,844.63	33,079.12	9,545.44	19,568.58	68,844.63	0.00
Medium	39,596.56	8,635.52	25,776.04	53,710.46	39,596.56	8,635.52	25,776.04	53,710.46	0.00
Large	55,069.71	0.00	55,069.71	55,069.71	52,571.70	0.00	52,571.70	52,571.70	-4.54
Other regions	22,056.87	6,853.81	5,417.78	53,824.96	22,546.03	6,517.97	5,417.78	53,824.96	2.22
Land less	15,332.61	4,387.52	7,211.65	25,811.24	21,335.43	3,463.97	14,501.18	46,000.27	39.15
Marginal	19,496.42	5,724.41	5,417.78	39,730.04	20,788.80	5,487.74	5,834.78	47,129.32	6.63
Small	21,854.80	6,298.68	6,762.62	50,249.44	21,854.80	6,298.68	6,762.62	50,249.44	0.00
Medium	26,794.50	8,009.83	7,198.84	53,824.96	26,794.50	8,009.83	7,198.84	53,824.96	0.00
Large	29,842.11	9,445.43	12,836.11	44,734.91	28,083.65	8,135.59	12,522.05	39,804.33	-5.89

Source: Author's Estimation

Table 3.4, 3.5 and 3.6 give the complete comparative picture before and after land reform, which is also, summarized in figure 3.3. Now, after the reform, the minimum land size for all samples becomes 0.05 ha (before it was 0.002 ha) and maximum of 7.45 ha (before it was 24.40 ha) as it is the maximum limit of land permitted by FALRA 2002 in Terai region. In case of Kathmandu Valley and other regions, the land ceilings are 1.52 and 3.81 hectares respectively.

After simulating the land size, the value of per capita income and consumption is calculated. As the result of simulated land reform, the welfare level (per capita income and consumption) increases for landless and marginal farmers, somehow decreases for large farmers and remains unchanged for small and medium farmers as shown in table 3.5 and 3.6. After land reform, average per capita income will be Nepalese Rupees (NPR) 14,732.46

(before it was NPR 14,183.71) while average per capita consumption will be NPR 23,712.25 (before it was NPR 22,993.26). This shows that there will be slight increase in per capita income and consumption after reform⁷.

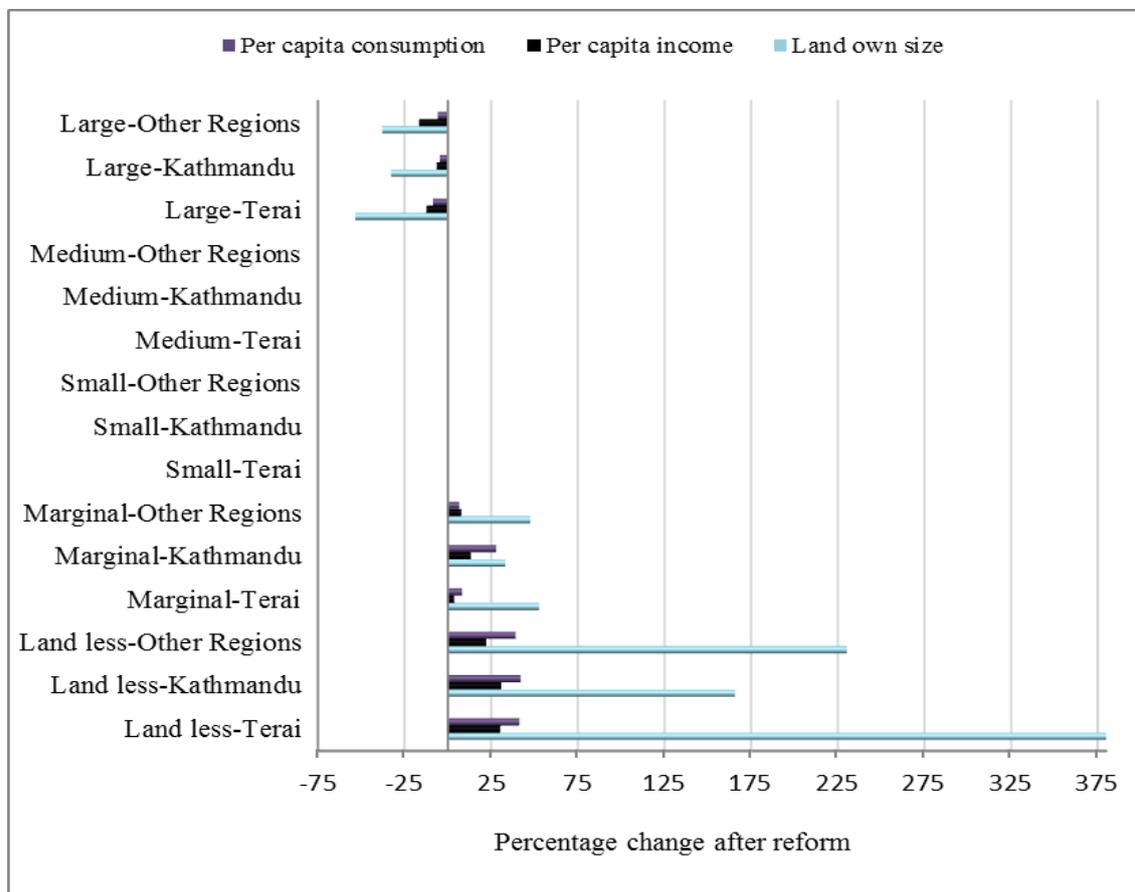


Figure 3. 3: Impact of Land Reform on Land Own Size, Per Capita Income and Consumption

Since, the landless and marginal tenants get more land, their income and consumption certainly increases. As average income in Nepalese households from land rental income is 13% (see table 2.15), at least half of this will be gained for the tenants if they were cultivating the landlords land. If they were not cultivating, they will gain more income. In the same time, there may be some cases where large landlords stop hiring labor and as the result of land reform, there might be some reduction in wage income for landless

⁷ Similar results were found using household income and household consumption as dependent variables to denote household welfare functions.

agricultural wage labors in short run till the adjustment mechanism works. This finding is consistent with the findings of other researchers and supports our hypothesis that land reform increases household welfare (income and consumption).

3.6.2 Land Reform Reduces Poverty

Table 3.7 shows the change in level of poverty before and after land reform. It is found that all the three indices of poverty slightly changed changes after reform. The poverty incidence (Po) which is also known as absolute poverty or poverty head count rate, in an average, changes from 25.2% to 22.1% after reform. The poverty level of Terai and other region changes but that of Kathmandu remains same. This is because there are less poor in Kathmandu (only 1.7%) but they are very poor.

Table 3. 7: Poverty Before and After Land Reform (in percentage)

Region	Poverty Incidence		Poverty Depth (P1)		Poverty Severity (P2)	
	Before	After	Before	After	Before	After
Terai	27.2 (0.011)	21.3 (0.010)	5.7 (0.003)	4.3 (0.003)	1.8 (0.001)	1.3 (0.001)
Kathmandu	1.7 (0.005)	1.7 (0.005)	0.3 (0.001)	0.3 (0.001)	0.1 (0.000)	0.1 (0.000)
Other Regions	30.0 (0.010)	28.8 (0.010)	7.4 (0.003)	7.0 (0.003)	2.7 (0.002)	2.6 (0.002)
Urban	7.0 (0.007)	7.0 (0.007)	1.2 (0.002)	1.2 (0.002)	0.4 (0.001)	0.4 (0.001)
Rural	33.7 (0.009)	29.2 (0.008)	7.8 (0.003)	6.7 (0.003)	2.7 (0.001)	2.3 (0.001)
Total Average	25.2 (0.007)	22.1 (0.006)	5.7 (0.002)	5.0 (0.002)	2.0 (0.001)	1.7 (0.001)

Source: Author's Estimation

Note: Standard error of estimate in (), all indices are calculated at 95% confidence level

To lift them up from poverty line more income is needed but in other cases some of the persons are near poverty line and they can come out of poverty with little increase in their income or consumption. This shows that land reform reduces poverty. Moreover, it is found that land reform has more impact in Terai and other regions than Kathmandu Valley. Similarly, there is more impact on rural poverty than in urban poverty. As the case of

Kathmandu Valley, the poverty level of urban area does not change after reform for the same reason.

These findings from poverty analysis are consistent with many other researches and support our hypothesis that land reform reduces poverty.

3.6.3 Land Reform Reduces Inequality

In order to check the reduction in inequality quantitatively, Gini coefficients, Theil index and coefficient of variation are calculated and shown in table 3.8. The figures show the reduction in inequality. Gini Coefficient was 0.25, 0.21 and 0.57 for per capita income, per capita consumption and household land holding respectively before land reform. After reform, it is reduced to 0.22, 0.19 and 0.50 respectively. Similarly, Theil index and coefficient of variation also show the reduction in inequality in the same manner. All the three inequality measures show that the predicted impact of land reform is not so large in spite of increased equality of land distribution. This finding is consistent with the findings of many other researchers and supports our hypothesis that land reform reduces inequality.

Table 3. 8: Inequality Before and After Land Reform

Inequality Measures	Income		Consumption		Land Holding	
	Before	After	Before	After	Before	After
Gini Coefficient	0.25 (0.003)	0.22 (0.003)	0.21 (0.002)	0.19 (0.002)	0.57 (0.012)	0.50 (0.011)
Theil Index	0.11 (0.004)	0.08 (0.003)	0.07 (0.002)	0.06 (0.001)	0.65 (0.037)	0.46 (0.014)
Coefficient of Variation	0.52 (0.012)	0.48 (0.009)	0.40 (0.010)	0.37 (0.007)	1.64 (0.121)	1.20 (0.038)

Source: Author's Estimation

Note: Standard error of estimate in (), all indices are calculated at 95% confidence level

3.7 Conclusion

Estimation results suggest the positive influence of own land holding size on per capita income and consumption. This shows the importance of the policy variable (own land

size) to increase household welfare. Based on the estimation results, an effect of land reform (FALRA 2002) by using simulation method is evaluated. Results show that land reform proposed by FALRA 2002 can reduce household poverty and inequality of income and consumption. However, land reform can help to reduce poverty and inequality by redistribution of surplus land; the predicted impact is not so large.

Existing studies regarding to Nepalese land reform suggest the positive impact on agricultural productivity and agricultural investment. These relations are not examined in this section. The quantitative examination of the relation is one of next research subjects, which is studied in chapter four.

4. An Efficiency Approach of Land Reform

4.1 Introduction

Nepal is a poor agricultural country in South Asian region with absolute poverty of 25.2 percent (Central Bureau of Statistics, 2011b). As land is the key asset in the context of poverty and the most reliable source of subsistence livelihood for poor, land resource needs to be directly or indirectly mobilized for accelerating economic development aiming to build a prosperous nation. As 36% share of GDP comes from agriculture (Ministry of Finance, 2013), Nepalese economy is primarily an agricultural economy. The average productivity of cereals is 2.48 metric tons per hectare (mt/ha) in Nepal, which is the lowest among neighboring countries. India has cereals productivity of 2.54 mt/ha, Pakistan 2.59 mt/ha, Srilanka 3.97 mt/ha, Bangladesh 4.14 mt/ha and China 5.52 mt/ha (World Bank, 2013).

Since, more than two third of total population is dependent on agricultural sector for livelihood (Ministry of Finance, 2013), without improving the productivity of this sector, it is almost impossible to lift the living standard of people and reduce the absolute poverty level. Investment in new technology, availability of extension services, market accessibility and farmers' knowledge are very important for the commercialization of agriculture, which can raise the productivity of this sector. We neither can create nor destroy the physical land because it is the natural gift with limited supply. In order to raise the nutrition level and living standard of poor people, it is necessary to increase agricultural productivity. Finding the sources of technical inefficiency if any and reducing those barriers to enhance efficiency is very crucial during the production process by utilizing the land resource.

Moreover, appropriate size of agricultural land and the management of it by the maximum possible efficient way is an important issue for Nepalese agriculture. Due to the

limited nature of agricultural land, the only alternative tool we have is the use of land in a more productive way using it by productive farmers. Redistributive land reform, in which the beyond ceiling land of large farmers and unused lands are distributed to the landless tenants by government policy decision, is one way to enhance productivity. Distributive land reform or ceiling reform provides opportunity for poor farmers to get land and use it to improve their livelihoods. This way of reform can reduce poverty and inequality of income and consumption in Nepal (as found in chapter three). Another way of reforming land is to find the sources of technical inefficiency and reduce them to enhance efficiency in farming. Here, the second way of reforming agricultural land in Nepalese agriculture is focused.

In the above-mentioned context, in this chapter, the relationship between household cultivated farm size (landless, marginal, small, medium and large) and technical efficiency of farmers in production is studied. The main objective of this study is to identify the efficiency gap and analyze the sources of technical inefficiency in Nepalese agriculture. Is there any inefficiency in production? If any, what are the sources of inefficiency? Does cultivated household farm size matters for technical efficiency? Does efficiency vary according to cultivated farm size and region? How fragmented are the farms in Nepal? Are fragmented farms inefficient? How land reform implementation can reduce inefficiency? These are the main research questions in this paper. For seeking the answers, the production frontier by using stochastic production frontier (SPF) methods is estimated and mean technical efficiency is found. The technical efficiency by using data envelopment analysis (DEA) method is also calculated.

Our null hypotheses are- Farmers in Nepalese agriculture exhibit constant returns to scale production technology, they produce on the frontier, they do not have any technical inefficiency, farms in all regions are equally efficient, there is no difference in efficiency based on household cultivated farm size and land fragmentation does not have any effect on

technical efficiency. To check the validity (acceptance or rejection) of these null hypotheses, the production behaviors by using SPF and DEA methods are estimated and mean efficiencies based on regions and size of cultivated farms are found and compared. Moreover, to see the relationship between land fragmentation and efficiency, Simpson's index is calculated.

The findings of this paper suggest that farmers are operating less than frontier and the gap is 30 percent based on SPF and 32 percent based on DEA. Moreover, there are many sources of inefficiency such as more fragmented lands (higher Simpson's index), unused land in households, and chronic illness of the head, less irrigation facilities, lack of extension services, lack of farmers' education and lack of use of modern equipment etc. Land is found to be the most important input for production and appropriate farm size matters for raising efficiency of farmers. More importantly, landless and large holdings are less efficient but small and medium holdings are technically more efficient. Moreover, large sized farms are more fragmented and more fragmented farms are less efficient. Reducing sources of inefficiency by making appropriate size of farm, the commercialization of agriculture and consolidation of fragmented farms are integral parts of land reform and implementation of which can enhance technical efficiency in Nepalese agriculture.

4.2 Relevant Literatures

To measure the technical efficiency or inefficiency of farmers, many researchers used stochastic frontier analysis (SFA) and data envelopment analysis (DEA) and analyzed the sources of inefficiency in production of agricultural output.

Going through relevant empirical literatures, it is found that there are many studies estimating efficiency or inefficiency effects of different grain producers based on different countries, regions, farms, crops, etc. using cross section, time series or panel data. For

example, using cross-section data and frontier function, Taylor & Shonkwiler (1986); Squires & Tabor (1991) estimated technical efficiency of about 70 percent on average. More importantly, Bravo-Ureta et al. (2007) used a meta-regression analysis including 167 farm level technical efficiency studies of developing and developed countries and found the overall efficiency of 76.6 percent.

Similarly, Odec (2007) estimated average efficiency of 72 percent for Norwegian grain producers. Additionally, Tian & Wan (2000), Kaur et al. (2010), Hasan & Islam (2010), Dagistan (2010), Kurkalova & Jenson (2000) studied technical efficiency of cereal grain (rice, wheat or corn) farmers and they found mean efficiency between 70 to 80 percent. Many other studies (for example, Wu, Devadoss & Lu, 2003, Latruffe et al., 2004, Tipi & Rehber, 2006) also estimated technical efficiency of farmers and found similar results using a different data set from different countries.

Most of the aforementioned studies identified that there are different factors having some level of impact on the technical efficiency of agricultural production. Their findings suggest the inefficiency effects such as lower level of farmers' education and experience, lack of market access, lack of irrigation, etc. which are almost common in most of the existing literatures.

There is a debate in literature about land size and production efficiency. The relationship between farm size and productivity in developing countries is one of the oldest issues in the academic circles. Many studies mentioned that Chayanov was the first who identified an inverse relationship (IR) in Russian agriculture in the twenties (Bhalla & Roy 1988). The study of Sen (1962, 1966) found IR between farm size and output per hectare. His findings suggest that small farms are more productive compared to large ones in Indian agriculture. Furthermore, many studies (Bardhan, 1973, Carter, 1984, Heltberg, 1998) re-examined IR from different angles using various statistical techniques and found that small

farms use more family labor reducing the monitoring and supervision costs of hired labor and have a relative advantage.

Numerous studies provided empirical evidence at the micro-level of the existence of an IR between farm size and the efficiency of input use. As farm size increases, efficiency declines (for example, Binswanger, Deininger & Feder, 1995, Van Zyl, Binswanger & Thirtle, 1995). Under condition of surplus labor, there is the superior social efficiency of small farms and smaller farms also produce more per acre than larger ones and reach a higher total factor productivity when labor and capital are valued at their social opportunity cost (de Janvry, 1981). This relationship is basically due to higher efficiency of family labor as compared to hired labor.

Moreover, the IR is typically explained by the failure of rural markets for credit, labor and land, as well as by the difference in labor endowments between small and large farms. Family labor, as residual claimant of the output, has more incentives than hired labor to work intensively. This fact is analyzed in relation to reduction of unequal distribution of land holdings, assuming that redistribution of land will lead to a positive effect on farm productivity (Thapa, 2007).

In Nepalese context, Adhikari & Bjorndal (2012) studied the technical efficiencies of Nepalese agriculture using household survey data of 2003/04 and using stochastic distance function and data envelopment analysis methods. Using the translog functional form, they calculated technical efficiency of 73 percent. They could measure technical efficiency effects on Nepalese agriculture but their study did not mention about the existing land reform provisions and they also lack identifying the large household lands in their sample that are beyond the legal ceiling in size and less efficient in production. Their findings suggest that in Nepalese case medium farms (1.00–2.00 hectares) are more efficient. Similarly, Thapa (2007) examines the farm size and productivity relationship

using data from Nepalese mid hills and his finding supported the inverse relationship (IR) between farm size and output per hectare in Nepalese agriculture.

In this paper, nationally represented household survey data, Cobb-Douglas production frontier and DEA models are used and it is checked if the findings of previous studies are consistent using different production function and different cross section data in Nepalese context. In addition, household farm sizes are divided into five categories as landless, marginal, small, medium and large. Then, Simpson's index of land fragmentation is calculated across land size and regions. The operationalization of land size is different in different regions and location specific based on current land laws (see table 2.5). More importantly, Simpson's index is used as one of the explanatory variables to estimate technical inefficiency. Moreover, it is also identified that there exists a high degree of technical inefficiency in Nepalese agriculture, suggesting that there is a substantial prospect of increasing agricultural productivity using the existing level of inputs and resources more efficiently.

Though, land ownership rights, increasing productivity, land use planning, protection and conservation of agricultural and forestlands and land administration are integral parts of land reform in Nepal, in this chapter, the focus is given on the issue of land productivity by reducing technical inefficiencies prevailing in Nepalese agriculture. To the best of the knowledge, there are many papers those measure technical efficiencies and estimate inefficiency effects but there is no any paper that has linked technical inefficiency effects of Nepalese farmers to household land size category and identified the beyond legal ceiling lands which are subject to entail land reform implementation.

Moreover, using latest household survey data, this study estimates technical efficiencies based on regional categories of land proposed by FALRA 2002 and clearly identifies the need of land reform implementation in Nepal. It is found that small and

medium size farmers achieve a higher technical efficiency than landless, marginal and large farm sizes, suggesting that productive efficiency can be increased with the encouragement of creating small and medium size farms by means of land reform. In this context, this study may draw some attention of researchers and policy makers, which is also the importance of this study.

4.3 Empirical Methods

4.3.1 Data

The data source used in this study comes from a household survey (Central Bureau of Statistics, 2011a) and the data is used with the permission of Central Bureau of Statistics, Government of Nepal. This is a latest survey conducted by the Government of Nepal in 2010/2011 following the Living Standard Measurement Survey (LSMS) methodology developed and promoted by the World Bank and covers the whole country, five-development regions-- Eastern, Central, Western, Mid-Western and Far-Western region and 75 administrative districts.

The survey enumerated 5,988 sample households from 499 primary sampling units (PSUs) such as wards or sub-wards over 3 ecological zones, 5 development regions, 75 districts, 58 municipalities and 3,914 Village Development Committees. This cross section sample covers information from 34,344 individuals living in 5,988 households in the country.

This data collection was done in two stages using probability proportional to size (PPS) sampling method. This data is the representative of the whole country and contains wide range of information of sample households such as demographic characteristics of head and other members, housing, access to facilities, literacy and education, health services, maternity and family planning, migration and absentees, agriculture, consumption, income,

employment status, farm and non-farm activities, remittances and transfer income, borrowing and loans, consumption adequacy, facility provided by the government, nutrition of children, etc.

Agriculture further includes information about farming and livestock. Farming includes landholding (land owned and rental arrangements), increase and decrease in holding by land buying and selling, production and use of inputs, expenditure and earning from agriculture, ownership of livestock and farming assets and extension services.

In this study; 3,799 households out of 5,988 records are taken for analysis and others are dropped due to incomplete information.

4.3.2 Model

In this chapter, two methods of analysis, namely stochastic production frontier (SPF) and data envelopment analysis (DEA) are applied to measure technical efficiency in Nepalese agriculture. The Cobb-Douglas Production Function is given as follows:

$$(4.1) \quad \ln(y) = \alpha + \beta \ln(\Sigma x) + \varepsilon$$

Where, y is agricultural output, x is a vector of inputs, α is constant and β is a vector of parameters, ε is the error term. The inputs are taken as labor, land, capital, seed, fertilizer, and other inputs.

4.3.2.1 Stochastic Production Frontier

A model within which observed deviations from the production function could arise from two sources is proposed by Aigner, Lovell & Schmidt (1977) and Meeusen & Van den Broeck (1977). The two sources are: farm specific effects (expected to be of either sign) and productive inefficiency (necessarily be of negative sign). To incorporate this feature, there is necessity to introduce a random variable, which represents an error term. In order to capture

this, the stochastic model contains a composite error term that sums a two-sided error term, measuring all effects outside the firms' control, and a one-sided, non-negative error term, measuring technical inefficiency. Then resulting stochastic production frontier becomes.

$$(4.2) \quad y_i = x_i\beta + v_i - u_i$$

Where, the observed response y_i is a scalar output, x_i is a vector of inputs, β is a vector of the unknown parameters. As described in Coelli et al. (2005), a Cobb-Douglas stochastic frontier model takes the form:

$$(4.3) \quad \ln(y_i) = \beta_0 + \beta_1 \ln x_i + v_i - u_i$$

or

$$(4.4) \quad y_i = \exp(\beta_0 + \beta_1 \ln x_i + v_i - u_i)$$

or

$$(4.5) \quad y_i = \exp(\beta_0 + \beta_1 \ln x_i) \times \exp(v_i) \times \exp(-u_i)$$

where,

$\exp(\beta_0 + \beta_1 \ln x_i)$: deterministic term

$\exp(v_i)$: measurement error term

$\exp(-u_i)$: inefficiency term

The SPF model can be written as:

$$(4.6) \quad y_i = f(x_i\beta) \times \exp(v_i - u_i), \quad u_i \geq 0$$

Where u_i is a deficit of output from the frontier and the composite error is:

$$(4.7) \quad \varepsilon_i = v_i - u_i$$

The stochastic econometric approach enables to distinguish the effects of noise and inefficiency, thereby providing the basis for statistical inference. The model is such that the possible production y_i is limited above by the stochastic quantity $f(x_i\beta) \times \exp(v_i)$.

The noise component v_i is assumed to be independently and identically distributed (i.i.d.), symmetric, and distributed independently of u_i . In order to define technical

efficiency within the stochastic frontier framework, let us consider the above production function:

$$(4.8) \quad y_i = f(x_i, \beta) \times \varepsilon_i$$

Assuming for the error term, the observed output lies lower than the stochastic frontier and the relation becomes as:

$$(4.9) \quad y_i \leq f(x_i, \beta) \times \exp(v_i)$$

Therefore, we have technical efficiency (TE_i) of the i^{th} farm is the proportion of the observed output for the i^{th} farm, relative to the potential output defined by the frontier function can be given as follows:

$$(4.10) \quad TE_i = \frac{\text{observed output}}{\text{frontier output}} = \frac{f(x_i, \beta) \times \exp(v_i) \times \exp(-u_i)}{f(x_i, \beta) \times \exp(v_i)} = \exp(-u_i), 0 \leq TE_i \leq 1$$

In this way, technical efficiency is measured using a production possibility frontier and this will ensure that the observed output lies below frontier. If optimum efficiency is gained, it lies on the frontier.

4.3.2.2 Data Envelopment Analysis

Data envelopment analysis (DEA) is used to empirically measure productive efficiency of decision-making units (DMUs) and is a nonparametric method in operations research and economics for the estimation of production frontiers. DEA has the advantage of not assuming a particular functional form but identifies a frontier on which the relative performance of all utilities in the sample can be compared. Technical efficiency is defined as a ratio of weighted sum of outputs to a weighted sum of inputs in the DEA methodology, formally developed by Charnes, Cooper & Rhodes (1978). In this approach, the weight structure is calculated by means of mathematical programming and technology is assumed

to be constant in returns to scale (CRS). Furthermore, Banker, Charnes & Cooper (1984) developed a model with variable returns to scale (VRS).

Since, inefficiency measurement in SPF approach is output oriented, for uniformity in comparison, output oriented DEA method with variable returns to scale is employed here.

The structure of the model is as follows:

$$(4.11) \quad \max_{\theta} \text{ s. t. } \begin{cases} \sum_{i=1}^N \lambda_i x_{ij} \leq x_{Tj} & 1 \leq j \leq m \\ \sum_{i=1}^N \lambda_i y_{ik} \geq \theta y_{Tk} & 1 \leq k \leq n \\ \sum_{i=1}^N \lambda_i = 1 \\ \lambda_i \geq 0 \end{cases}$$

Where, $i \in \{1, 2, \dots, N\}$ is the i-th DMU

x_{ij} the j-th input used by DMU i

y_{ik} the k-th output used by DMU i

m : the number of inputs

n : the number of outputs

T in the model means DMU in the question of estimating efficiency.

From the model structure, $\theta^* = \arg \max \theta \geq 1$ follows:

$$(4.12) \quad TE_i = \frac{\text{actual value of production}}{\text{frontier value of production}} = \frac{1}{\theta^*}$$

4.3.2.3 Determinants of Inefficiency

In equation (4.10 & 4.12), technical efficiency (TE_i) that lies in between zero and one is defined. Once technical efficiency is estimated by using one of above mentioned methods (SPF or DEA), it is not difficult to compute technical inefficiency. Hence, technical inefficiency or simply inefficiency ($INFF_i$) is calculated as technical efficiency subtracted by one ($INFF_i = 1 - TE_i$). For convenience, the technical efficiency estimated by SPF methods is used.

Moreover, farm specific characteristics in explaining sources of inefficiency can be estimated by two ways - the first method is by directly including farm specific characteristics in the efficiency model, and the second method is to use a second stage regression model as applied in a number of studies including Kalirajan (1991), Sharma, Leung & Zaleski (1999) and Shafiq & Rehman (2000). Here, the second stage regression model is used in explaining inefficiency in Nepalese agriculture, which enables us to distinguish the sources of inefficiency in a production process of a farm. The technical inefficiency effects model is as follows:

$$(4.13) \quad \eta_i = \delta + \xi z_i + e_i$$

Where η_i is an inefficiency score ($1-TE_i$), used as a dependent variable, z_i , the vector of independent variables related to household and farm specific characteristics, δ is constant, ξ is the unknown parameter associated with the household and farm specific characteristics, and e_i , an independently and identically distributed (i.i.d.) error term with zero mean (μ) and constant variance (σ^2).

4.4 Estimation Results

4.4.1 Summary Statistics

Table 4.1 shows the summary statistics. Mean output is 59,039.55 Nepalese Rupees (NPR) ranging from NPR 438.87 to NPR 3,703,644.00. Average labor hours is 1,701.86, average cultivated land size is 0.58 hectares ranging from 0.002 hectares to 32.77 hectares. Average capital is NPR 3,312.37, average seed input is NPR 1,245.37 and average fertilizer input is NPR 1,595.29, average of other input is NPR 224.27. Average Simpson's index of land fragmentation is 0.40, average unused land dummy is 0.43, average age of household

head is 37.81 years, the average schooling of head is 4.65 years and average of chronic illness of head dummy is 0.09.

Table 4. 1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
<u>Dependent Variable</u>				
(y) Output (NPR)	59,039.55	134,213.20	438.87	3,703,644.00
<u>Independent Variables</u>				
(x1) Labor (hours)	1,701.86	2,163.37	5.32	43,404.25
(x2) Land (hectares)	0.58	1.15	0.002	32.77
(x3) Capital (NPR)	3,312.37	5,546.14	45.00	178,800.00
(x4) Seed (NPR)	1,245.37	5,723.66	15.00	208,000.00
(x5) Fertilizer (NPR)	1,595.29	7,457.62	15.00	348,825.00
(x6) Other inputs (NPR)	224.27	284.67	10.00	6,000.00
<u>Inefficiency effects</u>				
(z1) Simpson's index	0.40	0.29	0.00	0.91
(z2) Unused land (dummy)	0.43	0.50	0.00	1.00
(z3) Age of head (years)	37.81	19.23	16.00	99.00
(z4) Schooling of head (years)	4.65	4.41	0.00	17.00
(z5) Chronic illness of head (dummy)	0.09	0.28	0.00	1.00
(z6) Extension service (dummy)	0.24	0.43	0.00	1.00
(z7) Year round irrigation (dummy)	0.09	0.28	0.00	1.00
(z8) Use of modern equipment (dummy)	0.48	0.50	0.00	1.00
(z9) Availability of agricultural loan (dummy)	0.12	0.33	0.00	1.00
<u>Regions (dummy)</u>				
(z10) Kathmandu Valley	0.03	0.18	0.00	1.00
(z11) Terai	0.40	0.49	0.00	1.00
(z12) All other regions	<u>0.57</u>	<u>0.49</u>	<u>0.00</u>	<u>1.00</u>
(z12-1) Hills	0.49	0.50	0.00	1.00
(z12-2) Mountains	0.08	0.27	0.00	1.00
<u>Size of land (dummy)</u>				
(z13) Landless	0.07	0.26	0.00	1.00
(z14) Marginal	0.24	0.43	0.00	1.00
(z15) Small	0.59	0.49	0.00	1.00
(z16) Median	0.09	0.29	0.00	1.00
(z17) Large	0.01	0.07	0.00	1.00
Number of observations				3,799

Source: Author's Estimation, Note: NPR-Nepalese Rupees (1USD=86.50 NPR in April 2013)

Similarly, average extension service dummy is 0.24; average of year round irrigation dummy is 0.09. Average of use of modern equipment dummy is 0.48 and average availability of agricultural loan dummy is 0.12. The regional distribution of household is-

three percent households in Kathmandu Valley, 40 percent households in Terai and the rest 57 percent households are from all other regions among which 49 percent are from Hills and eight percent are from the Mountains. Among 3,799 households, seven percent households are with landless holdings, 24 percent are with marginal holdings, majority of holdings (59 percent) are small, 9 percent are with medium sized holdings and only one percent are with large sized farm holdings¹.

Moreover, the dependent variable output is the total value of agricultural output in Nepalese Rupees, which is the product of price and quantity. Labor input includes both family and hired labor hours. Land input is the cultivated land in hectares. The land cultivated by a household is also known as household operated land. Cultivated land or land input is further defined as the sum total of household own land and rented in land from others less household own land rented out to others and unused land. Other inputs such as capital, seeds, fertilizers and other inputs are expressed in Nepalese Rupees.

4.4.2 Composition of Output by Crops

Table 4.2 shows the composition structure of production in Nepalese agriculture. Cereal crops are the most important crops that constitute 60.29 percent in total agricultural production.

Cereal crops category includes paddy, wheat, maize, millet, barley, buckwheat, etc. Fruits and vegetable constitute 19.19 percent in total production including citrus and non-citrus fruits and all types of vegetables. Pulses and legumes group comes third in total production share indicating 11.23 percent and share of cash crops is 9.29 percent in total.

¹ Due to the lack of complete information of all inputs used, some of the sample households are dropped. This may create some biasness in the estimation of efficiency. However, household weight is used to overcome this difficulty.

Table 4. 2: Share of Crops in Output

Crops Category	Crops Type	Share (%)
Cereal Crops	Paddy, wheat, maize, millet, barley, buckwheat etc.	60.29
Pulses and legumes	Soybean, gram, pea, lentil, potato, colocasia etc.	11.23
Cash crops	Oil seeds, sugarcane, jute, tobacco, spices etc.	9.29
Fruits and Vegetables	Citrus and non-citrus fruits and vegetables	19.19
Total		100.00

Source: Author's Calculation

4.4.3 Allocation of Inputs

Table 4.3 shows inputs per hectares by size of land. We can clearly see that lower the size of land higher is each input used. For example, the highest value of labor is 21,155.74 hours in landless holdings and lowest of 1,073.10 hours in large holdings. Average of labor hours is 7,579.73. We see a similar pattern in case of capital, seed, fertilizers and other inputs. Overall, average capital per hectares is NPR 15,986.91, average seeds per hectares is NPR 3,029.92, average fertilizer per hectares is NPR 3,437.63 and average of other inputs is 1,208.42.

Table 4. 3: Inputs per Hectare by Size of Cultivated Land

Inputs	Landless	Marginal	Small	Medium	Large	Total
Labor (hours)	21,155.74	11,909.30	4,986.67	2,355.06	1,073.10	7,579.73
Capital (NPR)	34,868.37	27,928.73	10,691.39	4,470.69	2,170.76	15,986.91
Seeds (NPR)	5,321.00	3,408.30	2,698.31	2,409.55	1,452.64	3,029.92
Fertilizer (NPR)	4,989.04	3,971.25	3,173.70	2,540.82	2,534.92	3,437.63
Other Inputs (NPR)	3,214.88	1,894.97	837.99	241.90	88.20	1,208.42
Total Observations	283	906	2,241	349	20	3,799

Source: Author's Calculation

Table 4.4 shows inputs per hectares by region. The value of every input is highest in Kathmandu Valley except seeds. For seeds, the highest value is in Terai region. Similarly, each of the inputs is the lowest in all other regions.

Table 4. 4: Input per Hectare by Region

Inputs	Kathmandu Valley	Terai	All Other Region	Total
Labor (hours)	15,045.61	8,714.27	6,345.47	7,579.73
Capital (NPR)	36,152.53	22,135.97	10,515.09	15,986.91
Seeds (NPR)	3,480.79	3,917.34	2,387.78	3,029.92
Fertilizer (NPR)	7,128.46	5,286.65	1,934.62	3,437.63
Other Inputs (NPR)	2,116.63	1,560.33	910.02	1,208.42
Total Observations	130	1,502	2,241	3,799

Source: Author's Calculation

4.4.4 Land and Labor Productivity

Table 4.5 shows land and labor productivity by cultivated land size. Highest land productivity of NPR 342,484.30 per hectares is found in marginal holdings while the lowest land productivity of NPR 82,993.70 per hectares is found in large holdings.

Table 4. 5: Productivity of Land and Labor by Size of Cultivated Land

Size of land	Land productivity (output value in NPR/hectares)	Labor productivity (output value in NPR/hours)
Landless	253,638.00	65.83
Marginal	342,484.30	85.23
Small	169,007.40	123.76
Medium	90,187.67	174.35
Large	82,993.70	164.50
Total	208,989.50	115.12

Source: Author's Calculation

After marginal holdings, land productivity is higher in landless holdings, smallholdings and medium holdings. In contrast, highest labor productivity of NPR 174.35 per hours is found in medium holdings. After medium, large holding have higher labor productivity than others and landless holdings have least labor productivity of NPR 65.83 per hours.

Table 4.6 shows the productivity of land and labor by region. Highest land productivity of NPR 360,842.62 per hectares is found in the Kathmandu Valley and lowest of NPR 145,189.40 per hectares is found in all other regions. In the case of labor productivity, highest of NPR 152.64 per hours is found in Terai and lowest of NPR 89.30 per hours is found in all other regions. Overall, average land productivity is NPR 208,989.50 per hectares and average labor productivity is NPR 115.12 per hours.

Table 4. 6: Productivity of Land and Labor by Region

Regions	Land Productivity (output value in NPR/hectares)	Labor Productivity (output value in NPR/hours)
Kathmandu Valley	360,842.60	112.02
Terai	287,893.80	152.64
All Other Regions	145,189.40	89.30
Total	208,989.50	115.12

Source: Author's Calculation

4.4.5 Estimation of Stochastic Production Frontier

Table 4.7 shows the estimation results of SPF model. Here, the Cobb-Douglas Production Frontier with one output and six inputs is estimated. All of the coefficients of inputs are positive significant. Land has the highest coefficient of 0.27 followed by other inputs (expenditures on irrigation, transportation, draft animals, storage, management, etc.), fertilizer, labor, capital and seed. Moreover, labor and capital have same coefficient of 0.09. Land input has the highest impact on output showing a 10 percent increase in land input that is associated with a 2.70 percent increase in output. In the similar way, a 10 percent increase in labor has an impact of 0.9 percent increase in output and 10 percent increase in capital, seeds, fertilizer and other inputs, have the impact of increase in output by 0.9 percent, 0.7 percent, 1.1 percent and 2.5 percent respectively.

Table 4. 7: Estimation of SPF Model

Variables	Coefficient	z-value
<u>Dependent variable: ln(Output)</u>		
ln(Labor)	0.09 ***	8.41
ln(Land)	0.27 ***	20.61
ln(Capital)	0.09 ***	11.16
ln(Seed)	0.07 ***	7.8
ln(Fertilizer)	0.11 ***	13.39
ln(Other inputs)	0.25 ***	19.82
Constant	7.71 ***	70.74
ln (sigma squared v)	-0.93 ***	-22.09
ln (sigma squared u)	-1.31 ***	-16.08
lambda	0.83 ***	
Wald chi squared (6)		3394.88***
Log likelihood value		-4553.08
No. of observations		3,799

*** Significant at 1 %, ** at 5% and * at 10% level

Source: Author's Estimation

The sum of all the coefficients of the inputs is 0.88 (0.09+0.27+0.09+0.07+0.11+0.25) <1.00 and statistically significant, this shows that there is decreasing returns to scale production technology, rejecting our null hypothesis of constant return to scale. Since the coefficient of sigma, squared u is statistically significant showing that there is some technical inefficiency present in the model. This also reveals that due to sources of inefficiency present in the production process, the observed output is less than the maximum possible output, which rejects our null hypotheses- farmers produce on the frontier and there is no technical inefficiency in Nepalese agriculture.

4.4.6 Cultivated Land Size and Technical Efficiency

Table 4.8 shows the mean efficiency scores in production based on SPF and DEA methods. Scores are presented by household cultivated land size across regions. In overall,

the mean technical efficiency in Nepalese agriculture is found to be 0.70 by SPF method and 0.68 by DEA method. Results show that SPF and DEA scores are positively correlated (correlation coefficient between them is calculated as 0.42), but they are not perfectly correlated and have different values in most of the cases both according to farm size and across regions. The results of this finding are consistent with the findings of Adhikari & Bjorndal (2012) as they found mean technical efficiency of 0.73 in Nepalese agriculture using 2004 data. Technical inefficiency in average is 0.30 (1-technical efficiency) for SPF and 0.32 for DEA methods respectively. This shows that there is the possibility of increasing production by about 30-32 percent if the farmers could achieve the maximum efficiency using the same resources they have on hand.

Small sized farms are the most efficient among all five sizes of farms. The average efficiency score of small farms is 0.76 (SPF) and 0.73 (DEA). Landless farms are the most inefficient with efficiency score 0.49 (SPF) and 0.58 (DEA). Medium farms are less efficient than small farms but more efficient than all other farms in case of SPF with efficiency score 0.70. While going through regions, Terai exhibits highest efficiency with score 0.71 (SPF) and 0.70 (DEA) followed by all other regions with efficiency score 0.69 (SPF, Hills-0.68 and Mountains 0.69) and 0.68 (DEA, Hills-0.69 and Mountains 0.68). Kathmandu Valley has the lowest efficiency with a score of 0.67 (SPF) and 0.63 (DEA) among the regions.

Comparing farm sizes across three regions, results show that small household farms in Terai region are the most efficient among all (with an efficiency score of 0.77) in case of SPF and small farms in Mountains in case of DEA (with an efficiency score of 0.75). In contrary, landless household farms in Terai are the most inefficient (with mean efficiency of 0.44) in case of SPF and large farms in the Kathmandu Valley are the most inefficient (with mean efficiency of 0.47) in case of DEA. The results presented in table 9, reject our null

hypotheses - farmers in all regions are equally efficient and there is no difference in efficiencies based on household farm size.

Table 4. 8: SPF and DEA Technical Efficiency Scores by Cultivated Land Size and Regions

Category	Obs./Type	Kathmandu	Terai	All other regions			Total
		Valley		Total	Hills	Mountains	
Landless	Obs.	33	118	132	118	14	283
	SPF	0.52	0.44	0.53	0.53	0.47	0.49
	DEA	0.52	0.60	0.58	0.57	0.63	0.58
Marginal	Obs.	14	502	390	335	55	906
	SPF	0.61	0.65	0.62	0.61	0.65	0.63
	DEA	0.50	0.56	0.60	0.60	0.61	0.58
Small	Obs.	67	784	1390	1181	209	2241
	SPF	0.75	0.77	0.75	0.75	0.75	0.76
	DEA	0.69	0.72	0.74	0.74	0.75	0.73
Medium	Obs.	15	91	243	210	33	349
	SPF	0.69	0.73	0.68	0.68	0.70	0.70
	DEA	0.65	0.67	0.65	0.65	0.70	0.66
Large	Obs.	1	7	12	10	2	20
	SPF	0.66	0.58	0.50	0.48	0.57	0.53
	DEA	0.47	0.69	0.73	0.77	0.57	0.70
Total	Obs.	130	1,502	2,167	1,854	313	3,799
	SPF	0.67	0.71	0.69	0.68	0.69	0.70
	DEA	0.63	0.70	0.68	0.69	0.68	0.68

Source: Author's Estimation

Note: Obs.- Number of observations, SPF-SPF estimates, DEA- DEA estimates

Land productivity and optimal land use may be location specific, but widely separated regions can have common characteristics (Community Self Reliance Center, 2009). Farmers from Terai region are relatively more efficient than farmers in other regions. Farmers in Kathmandu Valley are less efficient than other two. This is because Terai is a plain area with productive quality of land. Compared to other areas, farmers in Terai have

more access to irrigation; transportation, seeds, fertilizer, storage, etc. The Kathmandu Valley is the capital of Nepal with three major metropolitan cities named- Kathmandu, Lalitpur and Bhaktapur. The land price is higher and most of the land is used for residential purpose. In this region, land is fragmented into small pieces and mean size of a farm is smaller compared to other regions, which is also a reason for less efficiency.

Small and medium household farms are the most efficient among all. This is because, in one way, they are manageable and in another way, their size easily permits to use improved technology. Since landless and marginal farms are very small and there is no incentive to use modern technology due to the small size nature and large size farms are difficult to manage because maximum of them is 32.77 hectares. However, our data contains only 20 households with large sized farms, they are very important because they are the representative of beyond ceiling lands of the country. Furthermore, figure 4.1 shows the relationship between household land size and technical inefficiency. The actual values and fitted values of inefficiency are plotted against land size. For landless, marginal and large sized lands, the inefficiencies are higher but for small and medium sized lands, inefficiencies are lower.

This shows that in Nepalese agriculture, land reform is needed to make the farm size manageable; such as small and medium or in between them (small-medium). Too much fragmented land needs to be consolidated to make small and medium sized farms and large cultivated farms beyond limits also need to be reduced to make them small-medium sized family farms.

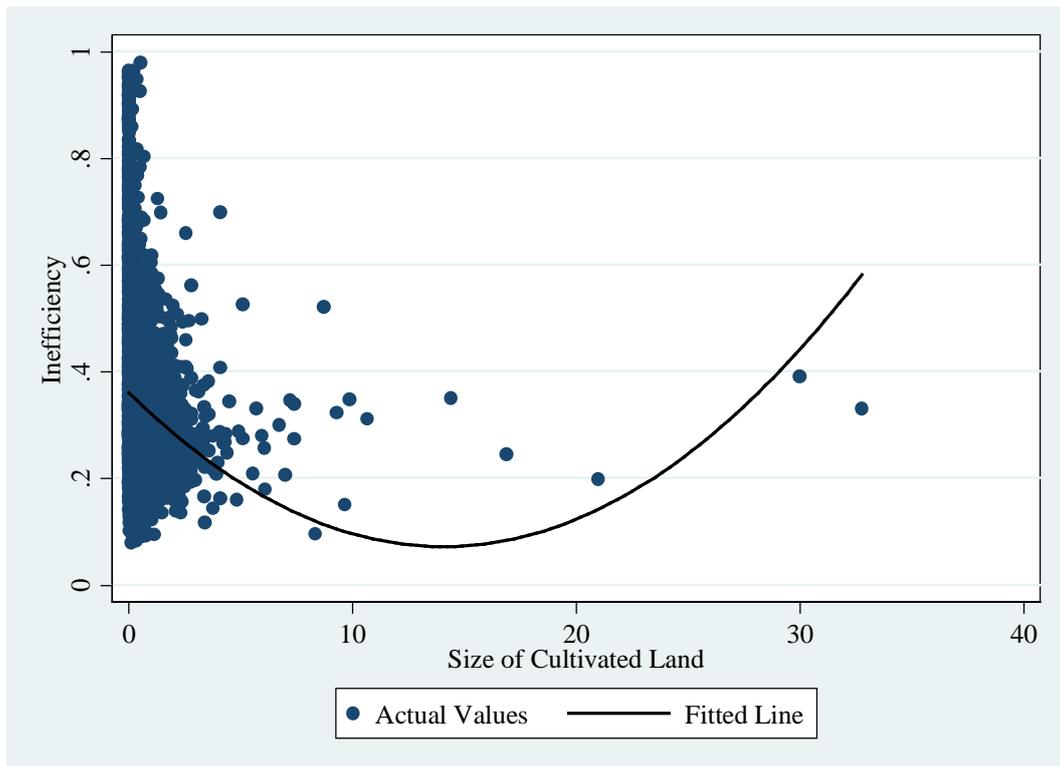


Figure 4. 1: Relationship between Cultivated Land Size and Technical Inefficiency

4.4.7 Land Fragmentation and Simpson's Index

Table 4.9 shows the Simpson's index² of land fragmentation, parcels per households and mean size of land according to holding size and regional categories.

The landless household farms in the Kathmandu Valley have the least Simpson's index (0.03) indicating that they have almost very small single plot (mean parcel per household is 1.15 and mean size of land is 0.01 hectares) . On the contrary, large farms in Terai region have largest mean Simpson's index of 0.61 among all with 7.29 parcels per

² The value of SI lies between zero and one. Zero means only a single plot in a farm or it indicates complete land consolidation. However, one means numerous plots in a form indicating that the land is too fragmented. The formula to calculate Simpson's Index (SI) is as follows.

$$SI_k = 1 - \frac{\sum_{i=1}^n a_{ki}^2}{A_k^2}, \text{ where, } A_k = \sum_{i=1}^n a_{ki} = \text{size of } k^{\text{th}} \text{ farm and } a_{ki} = \text{area of } i^{\text{th}} \text{ plot of } k^{\text{th}} \text{ farm}$$

households and mean size of land is 15.32 hectares. Overall, mean Simpson's index is 0.40 with 2.78 of mean parcels per household and 0.58 hectares in the mean size of household cultivated land.

Table 4. 9: Mean Simpson's Index of Land Fragmentation by Land Size and Regions

Category	Obs./Type	Kathmandu Valley	Terai	All other regions	Total
Landless	Simpson's Index	0.03	0.15	0.35	0.22
	Parcels per HH	1.15	1.59	2.55	1.98
	Mean size of land	0.01	0.003	0.002	0.003
Marginal	Simpson's Index	0.15	0.22	0.35	0.27
	Parcels per HH	1.36	1.77	2.52	2.08
	Mean size of land	0.05	0.14	0.08	0.11
Small	Simpson's Index	0.27	0.39	0.49	0.45
	Parcels per HH	1.88	2.79	3.14	2.98
	Mean size of land	0.17	0.77	0.44	0.54
Medium	Simpson's Index	0.43	0.53	0.53	0.53
	Parcels per HH	3.00	4.22	3.73	3.82
	Mean size of land	0.69	3.12	1.60	1.95
Large	Simpson's Index	0.43	0.61	0.38	0.46
	Parcels per HH	3.00	7.29	3.25	4.65
	Mean size of land	2.14	15.32	8.93	10.83
Total	Simpson's Index	0.22	0.32	0.46	0.40
	Parcels per HH	1.78	2.46	3.06	2.78
	Mean size of land	0.19	0.71	0.52	0.58

Source: Author's Estimation, Note: HH-households

The correlation matrix in table 4.10 shows the correlation between Simpson's index, parcels per households and household cultivated farm size. There is a strong positive correlation (coefficient is 0.81) between parcels per households and Simpson's index. There is a weak positive correlation (coefficient is 0.14) between farm size and Simpson's index and also another weak positive correlation (coefficient is 0.20) between farm size and

parcels per household. This shows that when farm size goes up parcels per household goes up and Simpson's index increases with more parcels per household.

Table 4. 10: Correlation Matrix of Simpson's Index

Title	Simpson's Index	Parcels per HH	Size of Farm
Simpson's Index	1.00		
Parcels per HH	0.81	1.00	
Size of Farm	0.14	0.20	1.00

Source: Author's Estimation, Note: HH-households

4.4.8 Sources of Inefficiency

Table 4.11 shows the sources of inefficiency in Nepalese agriculture. Simpson's index is negative significant but Simpson's index square is positive significant. The relationship between inefficiency and Simpson's index is shown in figure 4.2 and figure 4.3. Other significant positive sources of inefficiency are unused land, chronic illness of head, landless holdings and large holdings. In contrary, significant negative sources are age of head, schooling of head, extension service, and year round irrigation, use of modern equipment and availability of agricultural loan. Similarly, Terai region, small and medium land size dummies are also negative sources.

The households which left some of their land as fallow, they do not cultivate it or do not use it in production process is unused land and if the households have any unused land, they have higher technical inefficiency by five percentage points than those who use all of their land in cultivation. On the one hand, some of the very small lands (almost landless or marginal sized) are left unused because they do not receive much output from cultivation and no other incentive to cultivate. On the other hand, some fraction of very large lands is also left unused because they are not manageable. Regarding the size of household land, results suggest that small and medium sized lands have a less inefficiency effect by three percentage points and one percentage point respectively than marginal household farms. In

contrary, landless household farms have more inefficiency effects by 12 percentage points than marginal household farms. Though results are insignificant because the size of the sample is very small (only 20 households with large sized lands in the sample data set), the relationship is positive to inefficiency effects suggesting that large household farms have more technical inefficiency effects by one percentage point than marginal farms. This shows that the farmers, which are liable to land reform by implementing FALRA 2002 (landless-receiving and large-losing), are technically less efficient than marginal, small and medium sized farmers, which are not affected by the current ceiling policy of land reform law. This reveals that there is an immediate need for strict implementation of prevailing land reform law if the efficiency of farmers is to be increased.

Age is also proxy of experience; therefore, more experienced farmers have less inefficiency. Schooling of the head has negative correlation with inefficiency effects suggesting that knowledge of farmer is very important to increase their efficiency. Farmers who are more educated have tendency to use new farming techniques, which will help to increase productivity in their farms. Similarly, the availability of extension service reduces inefficiency effects. The government provides extension services to farmers and the government technicians give advice about use of inputs, fertilizers and technology that helps to increase productivity. Availability of year round irrigation and use of modern equipment (e.g., tractor, threshers etc.), also reduce inefficiency in Nepalese agriculture. Similarly, availability of agricultural loan in farming is very important to decrease inefficiencies in farming. Moreover, providing agricultural loan to farmers facilitates them to purchase inputs and technology and increase output.

Farmers from Terai region are more efficient than farmers in Kathmandu Valley. Similarly, farmers from all other regions are also more efficient than farmers in the Kathmandu Valley but the relation is statistically insignificant. Since Kathmandu is the

capital city, the farmers around the capital are less efficient than farmers of Terai and all other regions (hills and mountains) because they have other opportunities too and they are less concentrated on farming than other farmers do. Moreover, most of the very small lands are fragmented and unused in Kathmandu Valley.

Table 4. 11: Estimation of Inefficiency Effects Model

Variable	Coefficient	t-value
<u>Dependent variable: Technical inefficiency score</u>		
Simpson index	-0.11 ***	-4.16
Square of Simpson index	0.15 ***	4.14
Unused land (dummy)	0.05 ***	9.76
Age of head	-0.01 *	-1.90
Schooling of head	-0.01 **	-2.25
Chronic illness of head (dummy)	0.02 **	2.67
Extension service (dummy)	-0.03 ***	-5.53
Year round irrigation (dummy)	-0.05 ***	-7.01
Use of modern equipment (dummy)	-0.03 ***	-7.07
Availability of agricultural loan (dummy)	-0.01 **	-2.12
<u>Regions (dummy)</u>		
Kathmandu Valley (standard)	–	–
Terai	-0.02 *	1.95
All other regions	-0.01	0.84
<u>Size of land (dummy)</u>		
Landless	0.12 ***	13.23
Marginal (standard)	–	–
Small	-0.03 ***	-6.46
Median	-0.01 ***	-3.67
Large	0.01	0.06
Constant	0.36 ***	28.96
F (16,3783)	54.92 ***	
R-squared	0.19	
No. of observations	3799	

*** Significant at 1 %, ** at 5% and * at 10% level; Source: Author's Estimation

The estimated equation from table 12 can be written as:

$$(4.14) \quad \begin{aligned} \text{Technical Inefficiency} = & 0.36 - 0.11 * \text{Simpson's Index} + 0.15 * (\text{Simpson's Index})^2 \\ & + 0.05 * \text{Unused Land} - 0.01 * \text{Age of head} - 0.01 * \text{Schooling of head} \\ & + 0.02 * \text{Chronic Illness of head} - 0.03 * \text{Extension Service} \\ & - 0.05 * \text{Year Round Irrigation} - 0.03 * \text{Modern Equipment} \\ & - 0.01 * \text{Agricultural Loan} - 0.02 * \text{Terai} - 0.01 * \text{All Other Region} \\ & + 0.12 * \text{Landless} - 0.03 * \text{Small} - 0.01 * \text{Medium} + 0.01 * \text{Large} \end{aligned}$$

The partial relationship of technical inefficiency and Simpson's Index is given as:

$$(4.15) \quad \text{Technical Inefficiency with Simpson's Index} = -0.11 * \text{Simpson's Index} + 0.15 * (\text{Simpson's Index})^2$$

If we plot the value of technical inefficiency (1-TE) and the fitted value of inefficiency (equation 4.14) against Simpson's index in horizontal axis; we obtain the relationship as shown in figure 4.2.

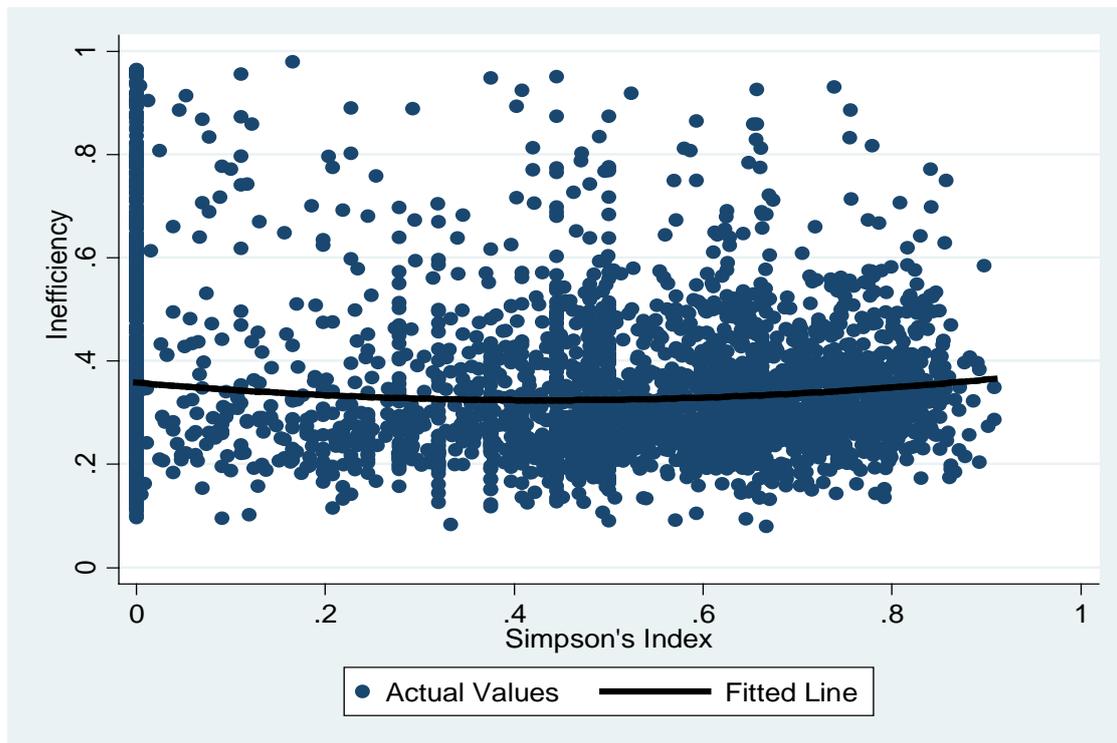


Figure 4. 2: Relationship between Simpson's Index and Technical Inefficiency

Additionally, the partial relationship between technical inefficiency and Simpson's index calculated using equation (4.15) is plotted in figure 4.3.

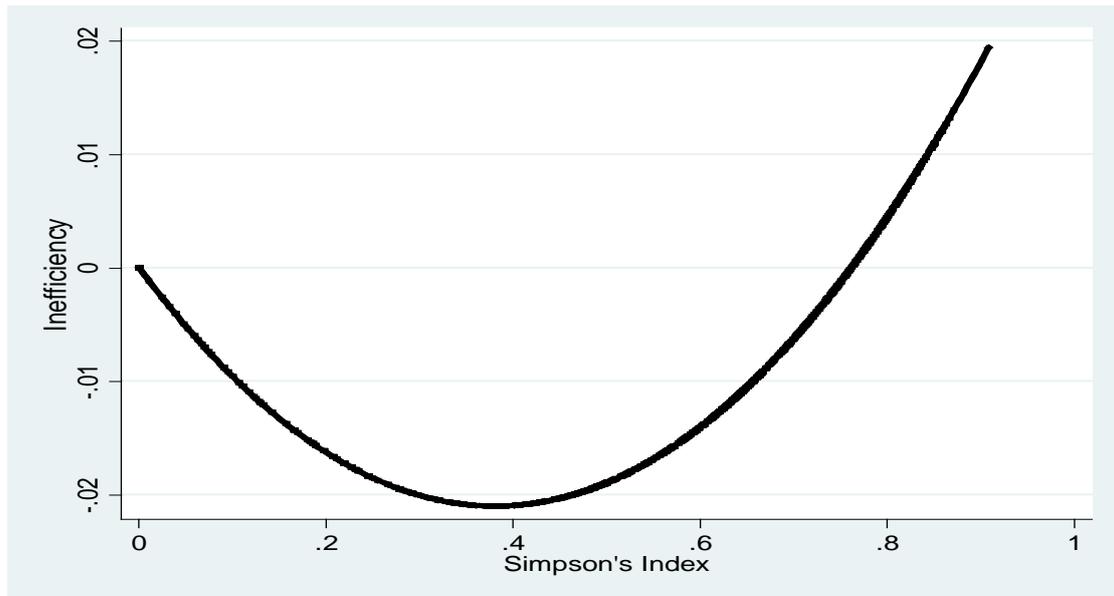


Figure 4. 3: Partial Relationship between Simpson's Index and Technical Inefficiency

According to figures 4.2 and 4.3, up to a certain level, the technical inefficiency decreases with Simpson's index and then it increases. Since there is a quadratic relationship between them, the inefficiencies are higher for more fragmented lands. Large sized household cultivated farms are more fragmented and they are more inefficient. Similarly, though less fragmented, landless and marginal sized household cultivated farms are very small and less efficient. Small and medium sized cultivated farms are moderately fragmented but they are more efficient than others are. At about 0.40 levels of Simpson's index, the farms have least inefficiencies, which is the minimum point in figure 4.3. Therefore, land fragmentation is also a barrier, which decreases efficiencies of farmers. This is because farmers have to spend more travelling time, more transportation costs of inputs for fragmented lands, and they have fewer incentives to use modern equipment, etc. If we could reduce land fragmentation and use all of the household own land for cultivation, the productivity of farmers will certainly increase³.

³ From equation 4.14, we can calculate that if the unused land vanishes (becomes zero) as the result of land reform and land fragmentation is reduced to yield 0.40 level of Simpson's index, 10% inefficiency can be reduced. This reduction in inefficiency increases agricultural production and we can call this type of effect of land reform as productivity augmenting reform or increase in agricultural production due to utilization and consolidation of land.

4.5 Conclusion

This study estimates technical efficiencies of Nepalese agriculture using SPF and DEA methods. The empirical application uses household level Nepal Living Standard Survey 2010/2011 data. The findings of this paper suggest that Nepalese household farms are operating less than frontier and inefficiency sources are common. The gap between frontier and actual production is 30 percent based on SPF and 32 percent based on DEA showing mean technical efficiency scores vary widely between household cultivated land sizes and regions. Estimated results show an overall mean technical efficiency score of 0.70 by SPF methods and 0.68 by DEA methods. Based on these results, sample households could increase about 30 to 32 percent of their output through better use of available resources. Additionally, estimated results reveal that the unused land is an important source of technical inefficiency. Farmers from Terai region are more efficient than those of other regions.

The landless and large operated farms are relatively less efficient in all regions. Farmers operating small and medium farms are relatively more efficient. Sources of inefficiency are fragmented lands, large size lands, unused idle lands, less educated farmers, less experienced farmers, less extension services, lack of use of modern equipment, lack of year round irrigation, lack of access to agricultural loan, and very small size of operated lands (landless) etc.

The largest population of Nepal (more than two third) is dependent on agriculture and agriculture is the major source of their livelihood. The poor are the one who are more dependent on agriculture and land is the key source for their income. Many literatures point out that large sized cultivated farms are more productive in developed countries because in these countries, agriculture is capital-intensive but the case is completely different in developing countries. In case of developing countries, as agriculture is a labor-intensive

industry, small size farms are more productive. However, in developing countries, the land size needs to be manageable for using modern technologies; it needs to be small-medium sized rather than landless, marginal or large.

The inverse farm size-efficiency relationship, which is also present in Nepalese agriculture, implies that substantial efficiency gains can be made if the operated farm sizes are made manageable (small-medium). This also has important implications for land reform supporting the demand for flexibility in policies regarding farm size and structure of agriculture, while also showing the value of proper training and extension aimed at increasing the farmer's managerial ability. The results clearly support the notion of a farm structure with small-medium farms immediate need for implementation of land reform. Moreover, land utilization and land consolidation can reduce about 10% of inefficiency in agricultural production.

For this rationale, land reform is the most essential action in developing countries' agricultural sector to boost up economic growth. So is in Nepalese agriculture, where land reform measures have an effect on large and landless households making them towards small-medium productive farms.

Additionally, reducing land fragmentation and utilization of all the households land for cultivation can augment production in Nepalese agriculture. What impact of production augmenting reform can be seen on macro-economy is a crucial issue for research, which is studied in chapter five and its appendix using general equilibrium based on social accounting matrix and input-out framework.

5. Economy Wide Impacts of Land Reform in Nepal

5.1 Introduction

Nepal is a small landlocked country sandwiched between two giants- China (in the North) and India (in the East, West and South). Low economic growth and high prevalence of poverty are the inherent features of Nepalese economy. The economic growth was about 4% for last decade (Ministry of Finance, 2013) and the absolute poverty in 2011 was 25.2% (Central Bureau of Statistic, 2011b). As average productivity of cereals crops is 2.85 metric tons per hectars (The World Bank, 2013), it is the lowest in South Asian Region¹. The country has diverse geographical topography and diverse climate with three distinct ecological regions. Mountains, Hills and Terai (Plain) are the three ecological regions with Kathmandu as the Capital.

According to Central Bureau of Statistics (2013a), only 17% of the country's total land is arable land and remaining contains mountains, step rocks, forest, pastures and water resources. This shows that Nepal is land scarce country for cultivation. Data show that 3% households have more than 17% land and 27% of households are landless and near landless² having only 5% land ownership (Central Bureau of Statistics, 2011a). This shows that the distribution of land is skewed. The landless do not have land for cultivation whereas some of the land with large landlords is left fallow. The visible inequality in land distribution is one of the causes of low productivity in Nepal because those who have farming skills do not have enough land and those who have land do not have farming skill or no necessity of

¹ South Asia region has 8 countries-Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka

² Near landless means those households that have marginal land insufficient for meeting their consumption need.

farming (Adhikari & Bjondal, 2012). This kind of adverse situation in land is causing a vocal demand of land reform among the stakeholders.

However, land reform was started in Nepal in 1951³ and comprehensive land reform law was commenced in 1964, the progress of land reform is very slow. Many studies (Regmi, 1977; Shrestha, 1990; Community Self-Reliance Centre, 2003; Adhikari, 2008; Adhikari & Bjorndal, 2009, etc.) evaluated the land reform process of Nepal as unsuccessful so far and indicated the need for successful land reform. Therefore, in this section, the impact of land reform in Nepal based of the whole economy wide scenario in social accounting matrix (SAM) framework is evaluated. If the updated ceiling provisions of current law (Nepal Law Commission, 2012) were implemented strictly what will be the impact of land reform on income distribution of households and in the whole economy is the main research purpose in this study.

Thus, to fulfill this research purpose, a fresh SAM for Nepal 2010/11 is estimated, the land endowment of each sample households is identified, the land ceiling permitted by current law is used and the beyond ceiling land is transferred to landless households and the change in land endowment is found. Similarly, three different scenarios for land reform are made and the effect of reform in the households income and the whole economy is evaluated. Here, it is intended to see the micro-simulation effect of land reform in macro-economy of Nepal.

The originality of this study is that a fresh SAM for Nepal 2010/11 is estimated, which links household factor endowments and household final demand induced from households using Nepal living standard survey dataset. Further, it is claimed that the micro simulation of land reform from households level and the impact of reform in macro-

³ Nepal's modern history begins in 1951 after the down fall of *Rana* rulers and the new initiatives of land reform was started

economy is the distinct feature of this study. To the best of our knowledge, this type of simulation study is new in literature.

5.2 Estimation of Nepal Social Accounting Matrix 2010/11

Social accounting matrix (SAM) is a numerical representation of circular flow of incomes and expenditures in an economy. SAM shows the inter-industry transaction in a single matrix. The column represents the outlays and rows receipts of each industry. SAM is a very useful tool for policy studies and it is further used for computable general equilibrium (CGE) modeling. SAM and its homologue input-output (IO) table are the basis for policy simulation for CGE modeling.

Estimation of system of national accounts is based on input-output table. System of National Account (SNA) shows the information regarding expenditures and incomes from different sources in an economy. They also show the payment to the factors and the gross value added in the economy. Consumption, production and the transactions to the rest of the world are also contained in the SNA. In case of Nepal SNA is published by Central Bureau of Statistics (CBS), a government agency under national planning commission but they do not have published the official input-output table and SAM yet. Therefore, if somebody wants to study computable general equilibrium, analysis for simulation based policy studies for Nepal; he/she either should rely of GTAP database or quit the research project. Therefore, a fresh SAM for Nepal 2010/11 is estimated based on newly estimated homologue IO table 2010/11 for Nepal (see Appendix 5A for input-output estimation and IO based impact of land reform in Nepal).

5.2.1 Review of Input-Output Table and Social Accounting Matrix in Nepal

Nepal is included in the eighth version of Global Trade Analysis Project (GTAP) database. Since there is no IO table and SAM published officially, it may be very useful for

policy makers, researchers and other concerned persons to know about Nepal SAM based on newly estimated IO table 2010. Here the author tries to show the detailed procedure for estimating SAM for Nepal and its application to know the impact of land reform in Nepalese economy. Before entering the topics, it is worth to mention about IO and SAM in brief. Table 5.1 shows the review of estimation of IO table and SAM in Nepal.

Table 5. 1: Input-Output Table and Social Account Matrix in Nepal

S. N.	IO/SAM	SAM of Year	Credit	Remark
1	The first IO table for Nepal ⁴	1986/87	Prepared by DSC (1991) with support of UNIDO	It was with 39 sectors
2	Extended IO table ⁵	1992	National Planning Commission (1992)	NPC disintegrated IO table of 1986/87 into 43 sectors
3	SAM for Nepal	1998	Sapkota & Sharma (1998)	Prepared 15 sector Nepal macro SAM based on Extended IO table
4	Nepal Macro SAM	2006	Acharya (2010)	Used four sector Nepal SAM 2006
5	SAM for Nepal	2007	Raihan & Khondker (2011)	Prepared for GTAP version eight and estimated 57 sectors SAM.

Source: Compiled by Author

Literatures mention that the first IO table for Nepal 1986/87 was prepared by Development Support Consultants (DSC) with technical support of United Nations Industrial Development Organization (UNIDO) in 1991 which contained 39 sectors but it is not available in any form of publication. Similarly, extended IO table 1992 is also unavailable. Sapkota & Sharma (1998) mentioned that they estimated 15-sector macro SAM in 1998 by using extended input-output table 1992. Acharya (2010) used four sectors macro SAM 2006 in his study. The SAM for Nepal 2007 prepared by Raihan & Khondker (2011)

⁴ Sapkota & Sharma (1998) mentioned about it but the IO table is unavailable

⁵ This is also mentioned in Sapkota & Sharma (1998) but the IO table is unavailable

as part of GTAP version eight is a more detailed with 57 sectors. Moreover, a 36 sectors IO table 2010/11 for Nepal is estimated.

5.2.2 Data Required

For the purpose of estimation of SAM for Nepal, 2010/11 is selected as the benchmark year for a couple of reasons. The first reason is that a fresh IO table of Nepal for 2010/11 is estimated in this study (see Appendix 5A for detail). The second is many other valuable facts of information are available for 2010/11, for example, Nepal living standard survey 2010/11, national population and housing census 2010/11, agricultural statistics of Nepal, Nepal overseas trade statistics, etc. Availability of information is very important to estimate SAM. Further factors income and household income and expenditure are linked to household level for which the latest Nepal Living Standard Survey 2010/11 is available in the same year, and it is also easy to extrapolate the household level actual and also imputed data in national level using population census. Moreover, the followings are the sources of data for estimation of IO table and SAM.

- i. The system of national accounts (Central Bureau of Statistics, 2013b)
- ii. Economic survey (Ministry of Finance, 2013)
- iii. Agricultural statistics of Nepal (Ministry of Agricultural Development, 2012)
- iv. Nepal overseas trade statistics 2011-12 (Ministry of Commerce and Supply, 2013)
- v. Nepal living standard survey III dataset (Central Bureau of Statistics, 2011a)
- vi. Nepal labor force survey (Central Bureau of Statistics, 2008)
- vii. National report on population census (Central Bureau of Statistics, 2012)
- viii. Previously estimated SAMs (for example Raihan and Khondker, 2011)
- ix. Input-output table of Nepal 2010/11 estimated by ourselves

5.2.3 Procedure for Estimation

First using system of national accounts (Central Bureau of Statistics, 2013b), a fresh input-output table of Nepal for 2010/11 is estimated. Further, using this IO table, a Macro SAM 2010 (see table 5.2) is estimated. In this SAM, domestic production, gross domestic production, gross value added, etc. are calculated as follows.

Domestic Production= Intermediate Consumption+ Value Added+ Indirect Taxes + Imports
of Inputs

Gross Domestic Product= Household Consumption + Government Expenditure +
Investment + Net Exports (Exports-Imports)

Value Added=Value added by (Labor+ Capital + Land) + Indirect Taxes

Gross Revenue=Indirect Taxes (Value Added Tax + Customs Duties) + Income Tax + Non-
Tax Revenue + Foreign Grants

Government Deficit/Surplus=Gross Revenue + Foreign Grants-Government Expenditure

Table 5. 2: Macro SAM for Nepal 2010 (in Billions Rupees)

	1	2	3	4	5	6	7	8	9	
	Activity	Commodity	Factors	Firm	Household	Government	Capital	ROW	Total	
1	Activity	Domestic Sales								Domestic Production (2126.03)
2	Commodity	Intermediate consumption (737.47)			Private Consumption (1085.73)	Government Consumption (138.43)	Investment (471.65)	Export (127.38)	Market Supply (2560.66)	
3	Factors	Value added (1253.54)							Factor Income (1253.54)	
4	Firm		Capita income (601.86)			Transfer (86.79)			Firm Income (688.66)	
5	Household		Labor income (651.68)	Dividend (348.49)		Transfer (38.07)		Remittance (267.74)	Household Income (1305.97)	
6	Government	Indirect taxes (31.56)	Indirect taxes (89.85)	Corporate tax (12.46)	Income Tax (36.11)	Government Services (202.06)		Foreign Grants (46.67)	Government Revenue (465.35)	
7	Capital			Corporate savings (327.70)	Household Savings (184.13)		Government deficit (46.63)	FDI (6.45)	Total Saving (518.28)	
8	ROW	Import (103.46)	Import (344.78)						Foreign Exchange Outlays (448.25)	
9	Total	Production cost (2126.03)	Absorption (2560.66)	Value Added (1253.54)	Firm Expenditure (688.66)	Household Expenditure (1305.97)	Government Expenditure (465.35)	Total Investment (518.28)	Foreign Exchange Earning (448.25)	

Note: Shaded blocks come from input-output table, Source: Estimated by Author

The macro SAM estimated in table 5.2 is disaggregated into micro SAM based on the research purpose and the need of research. First, we have to decide how many sectors

are needed for proposed policy simulation. Here macro SAM is disaggregated into 36 different sectors. Similarly, factors are disaggregated in three categories and households into 24 different socio-economic groups and the government into four groups. Based on IO table of Nepal 2010 estimated by ourselves, the macro SAM is disaggregated as shown in table 5.3. Table 5.3 shows two types of disaggregation of macro SAM. One is fully disaggregated SAM as shown in the right column and other is partially disaggregated SAM (aggregation of fully disaggregated SAM) in the middle column.

Table 5. 3: Disaggregation into Different Categories and Sectors

Category	Broad sectors	11 Sectors Classification	36 Sectors Classification	
Activities and Commodities: Sectors (36)	Agriculture (13)	Paddy (1)	Paddy	
		Wheat (1)	Wheat	
		Other grains & crops (6)	Other Grains, Vegetables & Fruits, Oilseed, Sugarcane, Jute and Other Plant Fibers, Other Crops	
		Live stocks and Fishery (5)	Cattle, Other animal products, Raw milk, wool, fishery	
	Forestry (1)			
	Mining & quarrying (1)			
	Manufacturing (11)	Food processing (6)	Grain milling, Meat processing, Cooking oil, Dairy product, Other food product, Beverage & tobacco	
		Other manufacturing (5)	Petroleum chemical, Metal, Vehicles machinery & equipment, Textiles & Apparels, Other manufacturing	
	Public utility (1)			
	Construction (1)			
	Services (8)		Trading, Hotels & restaurants, Transportation, Communication, Financial intermediaries, Real state and renting, Government Services, Other services	
Value Added (3)	Factors	Land (1)	Land	
		Labor (1)	Labor	
		Capital (1)	Capital	
Firms (1)				
Households (24)	Urban (9)	Rich (3)	Kathmandu, Terai, all other regions	
		Middle class (3)	Kathmandu, Terai, all other regions	
		Poor (3)	Kathmandu, Terai, all other regions	
	Rural (15)	Landless (3)	Kathmandu, Terai, all other regions	
		Marginal land (3)	Kathmandu, Terai, all other regions	
		Small land (3)	Kathmandu, Terai, all other regions	
		Medium land (3)	Kathmandu, Terai, all other regions	
		Large land (3)	Kathmandu, Terai, all other regions	
Government (4)		Income tax, Value added tax, Import tariff, Other government activities		
Capital (1)				
Rest of the World (1)				

Source: Author

5.2.4 Balancing of the Matrix

After disaggregation of macro SAM, it is required to match the total of different sectors to SNA and macro SAM. Matching sectoral share with SNA and balancing the matrix is a more tedious task. In the process of balancing of SAM, for matching it with macro economy, harmonizing sector share with gross domestic products, many exercises based on hit and trial methods are performed. If sums of all the rows of a matrix are equal to corresponding columns, then it is said that matrix is balance. Balancing of matrix takes the basis feature of double entry book keeping system that each expense has its own source. Therefore, for each sector, total expenses are always equal to total incomes. As mentioned above, information from different sources are taken. Due to their own way to express data, time-period differences, incompatibility between different sources, lack of complete information, lack of updated information, etc. may be some causes that row and columns of a SAM may be different. To overcome this bottleneck, balancing of matrix is necessary.

There are many methods to balance matrix, among which two standard methods are widely used in literatures. The first one is RAS methods and the second is cross entropy method. According to Parra and Wodon (2009) RAS is relatively simple and cross-entropy is very flexible and allows the inclusion of different types of constraints in the balancing process. SimSIP SAM developed by Parra and Wodon (2009) is a very convenient tool to balance matrix. This tool is used to balance SAM using both methods. The results are similar. Therefore, the balanced SAM using RAS is kept. Though, due to space limit, macro SAM as shown in table 5.2 is presented in this study, however, all the analyses are based on disaggregated micro SAM (See Appendix 5B for detail of disaggregated SAM).

5.2.5 The Originality and Features of Estimated Social Accounting Matrix

This SAM is estimated as a part of this doctoral research to use it for the study of impact of land reform in Nepalese economy. Therefore, the sectors, factors and institutions

are disaggregated to fulfill the research need. As the research is based on household survey data, in this SAM households are disaggregated into different 24 socio-economic groups based on income and household land endowment according to three distinct regions. Since, each region has different land ceiling permitted by law (see table 2.4), five land categories are used for each regions to divide rural households (see table 2.5).

Furthermore, urban households are separated into three groups according to their income level from each region according to the definition of national poverty line mentioned in Central Bureau of Statistics (2011b). The national poverty line is Nepalese Rupees 19,261.18 based on per capita consumption. Therefore, the originality of this SAM is that the final demand of households and households' factor income is directly induced from the latest household level data. The another feature is that activities and commodities are divided into 36 sectors which consists 12 sectors for agriculture, 11 sectors for manufacturing and rest 13 sectors for construction, trading, services and others. Similarly, factors are divided into three primary factors accounts (land, labor, capital) and government into four accounts - income tax, value added tax, import tariff, other government activities; one enterprise account, once capital account, and one rest of the world account.

A typical structure of the macro SAM for Nepal for 2010 is presented in table 5.2. From this table, we can express the amount in billions Rupees as the share that each column has certain percentage share of items in row. In activity, it pays 35% to commodity sector for intermediate inputs, 24% to labor, 26% to capital, 9% to labor, 1% to government as indirect taxes and 5% to the rest of the world for imports of raw materials. Similarly, commodity sector pays 83% to activity for final goods and services, 4% to government as indirect taxes and 13% to the rest of the world for imports. Labor sector pays 23% to firms for using capital and 77% to households as wages for using labor. Capital sector pays 83% to firm as rental price of capital for using capital and rest 17% to households as wages. Land

sector pays 12% to firm for using capital and 88% to households as wages. Similarly, firm pays 51% to households as dividend on their investment, 2% corporate income tax and saves 48% as corporate saving.

Moreover, household sector pays 83% to commodity sector for final households' consumption of goods and services, 3% as income tax to the government and 14% to capital account as household saving. Government pays 30% for government consumption, 19% transfers to firm as refund and subsidies, 8% to households for government welfare transfer to households, 43% transfer to the government account as income tax, indirect taxes, etc. 91% of capital account goes to investment and 9% goes to government account to maintain the government deficit. Rest of the world account pays 28% for exports to commodity sector, 60% to households for transfer of workers remittance and other factor income, 10% to government as foreign grants and 1% to capital account as foreign direct investment. This table gives the clear picture of share of expenditure of each sector in a circular flow of income model.

5.2.6 Structure of Household Income and Expenditure

Disaggregation of household sector based on different socio-economic category is unique in this SAM. The households are disaggregated based on poverty status and land assets across three regions. Households have main sources of incomes such as wage income from supply of labor, capital rents from investment, land rents from land assets, profit income from enterprises, government transfer to households in the forms of transfer income, remittances received from abroad, etc. Similarly, households spend major share of their income in consumption of goods and services. They pay taxes to the government and the saving is the residual remained after consumption and tax payment.

Table 5.4 shows the income share of each category of households from different sources of incomes. For example, the large share of urban rich-Kathmandu household

comes from the investment in enterprises (66%), 19% from remuneration of labor, 8% from investment of capital, 3% from land, 4% from government transfer and 1% from factor income from abroad. Landless households have more shares on labor income and large households have more shares on business enterprises income (firm income). As landless do not have land endowment, they do not have income from land.

Table 5. 4: Household Income from Each Source as a Percentage of Total Income

S.N.	Household Category	Labor	Capital	Land	Firm	Gov.	ROW	Total
1	Urban rich-Kathmandu	19.29	7.79	2.98	65.66	3.50	0.78	100.00
2	Urban rich-Terai	16.28	7.05	7.01	44.96	11.04	13.65	100.00
3	Urban rich-Other regions	4.89	4.44	6.18	41.08	3.86	39.54	100.00
4	Urban medium-Kathmandu	20.83	8.51	3.14	60.53	0.35	6.64	100.00
5	Urban medium-Terai	23.59	4.43	19.44	16.04	2.22	34.28	100.00
6	Urban medium-Other regions	29.93	5.68	12.46	16.36	3.95	31.62	100.00
7	Urban poor-Kathmandu	22.97	5.56	0.00	62.55	0.98	7.95	100.00
8	Urban poor-Terai	20.22	4.72	13.85	54.55	0.74	5.92	100.00
9	Urban poor-Other regions	22.61	5.36	9.29	59.87	0.83	2.04	100.00
10	Rural landless-Kathmandu	23.51	4.16	0.00	64.47	0.14	7.71	100.00
11	Rural landless-Terai	49.75	12.41	0.00	22.77	3.57	11.49	100.00
12	Rural landless-Other regions	32.99	18.63	0.00	38.24	0.14	10.00	100.00
13	Rural marginal-Kathmandu	7.97	3.12	0.00	16.40	0.14	72.37	100.00
14	Rural marginal-Terai	43.39	2.28	7.87	31.35	0.73	14.38	100.00
15	Rural marginal -Other regions	49.64	10.68	8.94	7.50	0.84	22.39	100.00
16	Rural small-Kathmandu	44.15	1.64	10.09	39.75	0.28	4.09	100.00
17	Rural small-Terai	31.97	3.81	20.10	26.29	2.24	15.59	100.00
18	Rural small-Other regions	41.52	13.29	15.30	15.29	1.75	12.85	100.00
19	Rural medium-Kathmandu	32.08	3.69	3.41	44.13	3.18	13.51	100.00
20	Rural medium-Terai	8.01	22.91	16.19	26.16	14.02	12.72	100.00
21	Rural medium-Other regions	16.34	9.07	14.59	43.06	4.64	12.29	100.00
22	Rural large-Kathmandu	18.19	2.23	6.59	56.55	0.49	15.95	100.00
23	Rural large- Terai	15.52	1.97	17.83	55.18	0.46	9.04	100.00
24	Rural large-Other regions	29.28	4.48	5.03	36.47	0.14	24.61	100.00
	Average of Rural Region	23.37	5.20	13.37	25.05	3.24	29.77	100.00
	Average of Urban Region	37.83	9.07	12.80	23.95	2.16	14.18	100.00

Source: SAM for Nepal 2010/11 Estimated by Author

Moreover, landless and marginal households have also small business income. The remittance incomes are higher for urban rich and medium households and rural marginal households in Kathmandu Valley. Rural medium-Terai households receive highest transfer income from government in the form of pension and social security benefits. Rural small, medium, large, and urban medium- Terai households receive more from land rents.

Comparing between the sources of income between households from rural region and households from urban region, it is found that average share of labor income is higher in urban region (37.8%) compared to rural (23.37%). This is because people work in formal sector in urban region and their salary is higher. Similarly, urban households have average share of capital rental income (9.07%) higher than rural households do (5.20%). However, share of other sources of income (land rental income, business enterprise income, government transfer income and foreign exchange income or remittance income) is higher for rural households.

Table 5. 5: Household Expenditure from Each Source as a Percentage of Total Expenditure

S.N.	Household Category	Commodities	Government	Capital account	Total
1	Urban rich-Kathmandu	68.20	11.79	20.01	100.00
2	Urban rich-Terai	67.81	12.64	19.55	100.00
3	Urban rich-Other regions	67.35	12.64	20.01	100.00
4	Urban medium-Kathmandu	67.19	3.64	29.17	100.00
5	Urban medium-Terai	66.44	4.75	28.81	100.00
6	Urban medium-Other regions	80.63	1.80	17.57	100.00
7	Urban poor-Kathmandu	93.58	0.24	6.17	100.00
8	Urban poor-Terai	96.94	0.30	2.76	100.00
9	Urban poor-Other regions	93.81	0.24	5.96	100.00
10	Rural landless-Kathmandu	95.66	0.17	4.17	100.00
11	Rural landless-Terai	98.25	0.34	1.41	100.00
12	Rural landless-Other regions	92.10	0.30	7.60	100.00
13	Rural marginal-Kathmandu	91.15	0.34	8.51	100.00
14	Rural marginal-Terai	97.60	0.29	2.11	100.00
15	Rural marginal -Other regions	94.18	0.22	5.60	100.00
16	Rural small-Kathmandu	85.95	0.54	13.52	100.00
17	Rural small-Terai	89.51	0.40	10.09	100.00
18	Rural small-Other regions	88.14	0.45	11.41	100.00
19	Rural medium-Kathmandu	83.38	0.63	15.99	100.00
20	Rural medium-Terai	88.24	0.45	11.31	100.00
21	Rural medium-Other regions	84.01	0.61	15.38	100.00
22	Rural large-Kathmandu	74.26	4.75	20.98	100.00
23	Rural large- Terai	79.74	2.33	17.93	100.00
24	Rural large-Other regions	83.08	0.64	16.28	100.00
Average of Rural Region		90.54	0.45	9.02	100.00
Average of Urban Region		74.79	4.42	20.79	100.00

Source: SAM for Nepal 2010/11 Estimated by Author

Table 5.5 shows the household's expenditure pattern. Rich and large households pay more taxes and save more but in comparison to others expend less on consumption of

commodities. Poor, landless and marginal households' expenditure share of consumption of commodities is higher with lower savings. Richer have less consumption, poorer have less saving and vice versa.

Comparing between the sources of expenditure between households from rural and urban region, it is found that average share of consumption expenditure on commodities is higher in rural households (90.54%) than urban (74.79%). However, share of taxes to government is higher for urban households (4.42%) than rural (0.45%). Similarly, share of saving is higher in urban households (20.79%) than rural (9.02%).

From Central Bureau of Statistics (2013a), it is known that 75% of labor force is engaged in agriculture (including forestry, fishery and mining) in Nepalese economy. Similarly, labor share in manufacturing is 7% and labor share in different services (including public utility and construction) is 18% while their share on GDP is 37%, 7% and 56% respectively. Additionally, from estimated SAM 2010, we have labor income. Using this labor income, number of labors engaged in different sectors is estimated. From these available information, finally, the labor engaged per billions Rupees of GDP in different sectors of Nepalese economy is estimated as shown in table 5.6.

Table 5. 6: Labor Engaged per Billion of GDP (in thousands)

Sectors	GDP (Billions Rupees)	Labor Income (Billions Rupees)	Labors (in '000)	Labor/Billions Rupees of GDP (in '000)
Paddy	96.78	60.93	2780.06	28.73
Wheat	25.72	15.92	726.33	28.24
Other grains & crops	269.12	122.32	5580.66	20.74
Livestock & fishery	94.62	38.95	1777.14	18.78
Forestry	15.51	7.91	361.08	23.29
Mining & quarrying	6.16	2.05	93.62	15.19
Food processing	28.22	2.58	278.52	9.87
Other manufacturing	71.14	7.20	777.91	10.93
Public utility	22.70	2.00	21.97	0.97
construction	96.25	16.70	183.56	1.91
Services	648.74	228.46	2511.01	3.87
Total	1374.95	505.03	15091.85	10.98

Source: Estimated by Author

The highest labor engagement is in paddy production. 28.73 thousands of labors are engaged to produce paddy worth of one billion Rupees of GDP. Next is wheat production engaging 28.24 thousands of labors. The least one is public utility production 0.97 thousands labors per billion followed by 1.91 in construction sector. The average engagement of labor is estimated as 10.98 thousands of labors to produce goods and services worth of one billion of GDP in Nepalese economy. Meanwhile, family labors work in agricultural production as part time workers in morning and evening as their household works besides their employment in non-agricultural sectors, it is very difficult to estimate the accurate figure of labors engaged in agriculture. However, the estimated figures in table 7 are comparable among sectors and give valuable information about the labor requirement in different sectors of Nepalese economy.

5.3 Impacts of Land Reform

Nepal has diversified landscape with the Northern part (Mountains) always covered by snow with high range of mountains, middle part (Hills) has been affluent with steep slopes and in comparison only the Southern low land plain area (Terai) has much productive land. In Nepal, only one fifth of total land can be used in agricultural production (Central Bureau of Statistics, 2013a), which implies that Nepal is a land scarce country and optimal use of land is the challenge for meeting the growing need of agricultural products. For this, the agricultural land needs to be managed in a productive way so that the agricultural production goes up and poverty level goes down with improvement of living standard of rural people.

Furthermore, with the aim of attaining optimal production in agriculture, the Government makes land reform laws and implements them time to time. In case of Nepal, the Land Related Act 1964 (Nepal Law Commission, 2012) is the momentous law for land

reform. It is amended many times and the mentionable amendment is the Fifth Amendment. The Fifth Amendment to the Land Related Act 1964 was done in 2002 (hereafter, FALRA 2002) that drastically reduced the land ceiling in the country aiming to use land in the most productive way. According to FALRA 2002, land ceiling was reduced by 60% in Terai (from 18.40 hectares to 7.45 hectares), 51% in Kathmandu Valley (from 3.10 hectares to 1.52 hectares) and 22% in all other regions (from 4.90 hectares to 3.81 hectares) including both agricultural and homestead land.

The law made provision of redistributive land reform in favor of poor farmers but the law could not come into force due to many barriers from opposing forces including deficiency of proper implementation of policy. Land reform in Nepal has always been criticized for lack of will power to implement it (Regmi, 1977). Even FALRA 2002 was not properly implemented indicating failed reform on land. The scenario of land distribution would be different if the land ceiling policy of FALRA 2002 were properly implemented. From Nepal living standard survey 2010/11, it is identified that 3% households have large plots of land beyond ceiling and 28% households are landless.

Moreover, having more household land shows a higher living standard, higher status in society, more influence in politics and it also helps as collateral for borrowing credit. As immovable assets, it has additional intrinsic value and more security. Additionally, in order to see the relationship between household own land size and social welfare and change in land size due to land reform, per capita household consumption function is estimated taking household owned land size (policy variable), households characteristics, land holding dummies, facilities dummies, regional dummies and ethnicity dummies as explanatory variables and estimated consumption function based on Nepal living standard survey (Central Bureau of Statistics, 2011a). If the land laws were implemented properly, the land

ceiling scenario would change and this would bring change in per capita household consumption.

The results of this estimates are presented in table 5.7 which are taken from chapter three and shows that transfer of beyond ceiling land from large holdings to marginal and landless will not only change the structure of land ownership but also the consumption pattern in Nepalese economy. The mean per capita consumption of large households will decrease but per capita consumption of landless and marginal households increase substantially. Land issues, and more specifically land reform issues are live issues in many developing countries including Nepal (Lipton, 2010) and they are more serious now than decades ago because land reform has not come to a logical end and the story of poverty and inequality is much more complex today. Consequently, using household level survey data, it is estimated that how implementation of redistributive land reform affects per capita consumption of households (see table 5.7).

Table 5. 7: Land Reform and Consumption Change

Land Category	Region	Household Land Size (in ha)			Mean Consumption (in Rupees)		
		Before Reform	After Reform	% change	Before Reform	After Reform	% change
Large	Terai	16.02	7.45	-53.48	85,150.67	77,781.00	-8.65
	Kathmandu Valley	2.26	1.52	-32.86	55,069.71	52,571.70	-4.54
	Other Regions	6.41	3.81	-37.97	29,842.11	28,083.65	-5.89
Marginal	Terai	0.15	0.22	52.61	20,959.91	22,651.56	8.07
	Kathmandu Valley	0.05	0.06	33.23	26,989.25	34,491.56	27.80
	Other Regions	0.08	0.12	47.49	19,496.42	20,788.80	6.63
Landless	Terai	0.02	0.12	379.89	14,271.02	20,152.00	41.21
	Kathmandu Valley	0.02	0.05	165.61	22,723.42	32,264.37	41.99
	Other Regions	0.03	0.08	230.34	15,332.61	21,335.43	39.15

Source: Extracted from table 3.4 and table 3.6

Moreover, stochastic frontier function is also estimated for Nepalese agriculture. Since, the input information for each sub-sectors in agricultural sector is not available, it is not possible to estimate stochastic production frontier for each sub-sector. Furthermore, it is found that household farms are operating less than frontier and inefficiency sources are

common. Besides, the gap between frontier and actual production is 30% and mean technical efficiency scores vary widely between household land sizes and regions. The landless and large household farms are relatively less efficient in all regions (Terai, Kathmandu and other regions). Farmers with small and medium holdings are relatively more efficient (see table 5.8). Moreover, sources of inefficiency are - fragmented lands, large size lands, unused idle lands, less educated farmers, less experienced farmers, less extension services, lack of use of modern equipment, lack of year round irrigation, lack of access to agricultural loan, and very small size of household's lands called landless.

Land reform will transfer land from landlords to the landless and marginal farmers who have hard working practices. If land reform policies were implemented and inefficiencies were eliminated, the agricultural productivity would rise even using the same level of inputs. According to table 5.8, mean technical efficiency in Nepalese agriculture is 70%. This implies that if all the inefficiencies were eliminated, the efficiency would be raised up to 30% maximum. In practice, we cannot eliminate all the inefficiencies.

Table 5. 8: Technical Efficiency Scores by Holding Size and Regions

Category	Kathmandu Valley	Terai	All other regions	Total
Landless	0.52	0.44	0.53	0.49
Marginal	0.61	0.65	0.62	0.63
Small	0.75	0.77	0.75	0.76
Medium	0.69	0.73	0.68	0.70
Large	0.66	0.58	0.50	0.53
Average	0.67	0.71	0.69	0.70

Source: Extracted from table 4.8

However, utilization of unused land and consolidation of fragmented land could reduce at least 10% of inefficiency in Nepalese agriculture. Therefore, for simulation purpose, it is assumed that 10% productivity can be raised by eliminating some of the inefficiencies.

5.4 Evaluation of Impacts

Land reform will bring economy wide impacts. This will not only reduce poverty and inequality and increase equity but also bring efficiency and increase productivity in an economy. Micro-based frameworks are good but not sufficient to know economy wide impacts. Input-output framework, social accounting matrix framework and computable equilibrium framework can be used. In this study, SAM framework is used, which might be helpful to know the impact of land reform in an economy.

5.4.1 Model

In order to study the impact of land reform, we use social accounting matrix framework. The following matrix multiplier model is used for simulation.

Table 5. 9: Model of Matrix Multiplier

	Endogenous accounts (n)	Sum of exogenous accounts(l)	Total
Endogenous accounts(n)	AX	F	X
Exogenous accounts(k)	BX		L
Total	X'		

Source: Sadoulet & de Janvry (1995)

The matrix multiplier model is given as:

$$(5.1) \quad X = AX + F$$

$$(5.2) \quad X = (I - A)^{-1} F$$

$$(5.3) \quad X = MF$$

Where, X is vector of total income or expenditure of the endogenous accounts, F is vector sum of the expenditures of the exogenous accounts, L is column vector of the income of exogenous accounts, A is a square matrix (nxn) of coefficients of endogenous accounts, B is a rectangular matrix (mxn) of coefficients with exogenous accounts as rows and endogenous accounts as column. The matrix of Multipliers is given as:

$$(5.4) \quad M = (I - A)^{-1}$$

Since ΔF being the vector of shocks, the vector of impacts is given as:

$$(5.5) \quad \Delta X = (I - A)^{-1} \Delta F$$

Similarly, the induced impacts or the leakages are given as:

$$(5.6) \quad \Delta L = B \Delta X$$

In this model, activities, commodities, factors, enterprises and households are taken as endogenous accounts and government accounts, capital accounts, rest of the world accounts as exogenous accounts. Moreover, in this model, land endowment is treated as policy variable (as exogenous variable) while land input is one of the factors of production and endogenous variable. Land input is the total operated land in the economy while land endowment is total owned land. Land endowment also includes unused land such as left fallow land. Data shows that it is about 3.39% (Central Bureau of Statistics, 2011a). The main reasons for unused land are due to the lack of labor force some part of land is left fallow by large households. Similarly, disputed land is left unused. In the process of land reform, the beyond ceiling land endowment is distributed from large holdings to landless and marginal holdings and the unused land comes under operation. This will increase the operated land in the economy. Finally, resulting land endowment and land inputs are the same after land reform. This will increase production in the economy.

5.4.2 Simulation Scenarios Setting

Using disaggregated Nepal SAM 2010 estimated in this study, three scenarios are set to know the impacts of land reform in Nepalese economy. SAM entries are in billions Nepalese Rupees. Land transactions are reported in hectors as shown in table 6. Transfer of beyond ceiling land from large holdings to landless and marginal holdings will change the households income and consumption. Therefore, for studying impact, different three

scenarios are made as follows to capture the concept of redistributive reform, productivity augmenting reform and both reform simultaneously.

Simulation 1: This simulation captures redistributive land reform presented in table 5.7. Due to the implementation of current ceiling policy, i.e., FALRA 2002, the large households lose their beyond ceiling land but landless and marginal households will receive land. This is a crucial national policy issue and the government will decide that transfer will be either with compensation or without compensation. Since, land is an important component of household income and consumption (Adhikari & Bjorndal, 2009), it is estimated in our study that the consumption of large households would be reduced and that of landless and marginal households would be increased by certain percentage (see table 5.7). This change is simulated within the household categories in this scenario and the direct and induced impacts of land reform are calculated. For this simulation, it is assumed that the households, which either gain or lose their income, are exogenous.

Simulation 2: According to table 5.8, maximum 30% technical efficiency could be gained by eliminating the inefficiencies presented in Nepalese agriculture. In theory, 30% may be possible but in practice, it may be impractical. Therefore, in this simulation, it is assumed that if productivity-augmenting land reform were implemented, at least 10% productivity of agricultural sectors (crops productivity) would rise. Eliminating mainly two barriers- utilizing the unused land and reducing land fragmentation will gain this productivity. Therefore, 10% increase in agricultural crops production is simulated in this scenario and direct and induced impacts are calculated. In this simulation, it is assumed that crop production activities are exogenous and other activities are endogenous.

Simulation 3: This simulation is the application of simulation 1 and simulation 2 simultaneously. At first, the redistributive reform is implemented and then 10% increase in agricultural crops production is applied as the outcome of land reform.

5.5 Results and Discussions

Table 5.10 shows the results of simulation of three scenarios. Using SAM framework, it is found in simulation 1 that the shock is the transfer of income from large to landless and marginal households as the result of implementation of ceiling policy. In this policy, agricultural production increases by 4.88% while non-agricultural production increases by 2.34% resulting total domestic production to be increased by 3.21%. GDP increases by 3.49%, urban income increases by 2.27% and rural income increases by 6.55% resulting increase in total household income by 4.95%. As the leakages effects, government revenue increases by 2.39%, saving increases by 2.64%, foreign exchange increases by 2.49% and employment increases by 4.20% in Nepalese economy. Distributive reform has more impact on agricultural production and rural income than on non-agricultural production and urban income. This shows that distributive reform is pro-poor.

In simulation 2, the shock is the increase in agricultural crops production by 10%. This type of policy has higher impact on macro-economy compared to distributive land reform. Agricultural production increases by 8.63% while non-agricultural production increases by 2.54% causing total domestic production and GDP to be increased by 6.61% and 5.11% respectively. In this policy simulation, both urban and rural income increase substantially by 4.34% and 5.62% respectively, this raises total household income by 5.14%. As the result of leakage effects, government revenue increases by 3.27%, saving increases by 5.07%, foreign exchange increases by 2.53% and employment increases by 7.48%. In SAM framework, productivity augmenting reform has higher impact on Nepalese economy than distributive reform, which is also true in input-output framework⁶ (see Appendix 5A for detail study about an input-output approach of land reform).

⁶ The impacts of redistributive and 10% productivity augmenting land reform in Nepalese economy are also calculated using input-output framework and found that the former increases GDP by 2.08% and later by 4.82% with income linkage model (for detail of input-output approach of land reform, see Appendix 5A).

In simulation 3, agricultural production increases by 10.48% while non-agricultural production increases by 5.39% resulting total domestic production to rise by 7.12%. The large amount of increase in agricultural production brings up the rise of GDP by 7.55%. Similarly, urban income increase by 5.42% and rural income increases by 9.34% with 7.88% rise in total household income. The induced impacts of this policy alternative are increase in government revenue by 7.55%, increase in saving by 6.74%, increase in foreign exchange by 6.67% and increase in employment by 8.97%. Simulation 3 is the policy option in which both types of reforms are used simultaneously. In fact, land reform should be done in such a way that both reform measures work together to boost the productivity of Nepalese economy reducing poverty and inequality.

Comparing between three policy scenarios given by three simulations, it is clearly seen that 10% productivity augmenting reform has higher impacts that distributive reform and both reforms simultaneously (simulation 3) has the highest impacts among the three alternative policies.

Table 5. 10: Impact of Land Reform (Direct and Induced)

Sectors	Baseline Values (billions Rupees)	Simulation 1		Simulation 2		Simulation 3				
		Shock	Change Value	%	Shock	Change Value	%	Shock	Change Value	%
Direct Impacts										
Agricultural Production	722.44	0.00	35.28	4.88	49.27	62.36	8.63	49.27	75.69	10.48
Non-Agricultural Production	1403.58	0.00	32.91	2.34	0.00	35.66	2.54	0.00	75.67	5.39
Total Domestic Production	2126.03	0.00	68.19	3.21	49.27	98.02	4.61	49.27	151.36	7.12
Gross Domestic Product	1374.95	0.00	47.96	3.49	41.91	70.24	5.11	41.91	103.85	7.55
Urban Household Income	485.98	0.00	11.02	2.27	0.00	21.11	4.34	0.00	26.32	5.42
Rural Household Income	819.99	36.74	53.68	6.55	0.00	46.07	5.62	36.74	76.59	9.34
Total Household Income	1305.97	36.74	64.71	4.95	0.00	67.18	5.14	36.74	102.91	7.88
Induced Impacts (Leakages)										
Government Revenues	169.99	0.00	4.06	2.39	0.00	5.56	3.27	0.00	12.84	7.55
Savings	518.28	0.00	13.71	2.64	0.00	26.29	5.07	0.00	34.92	6.74
Foreign Exchange	448.25	0.00	11.17	2.49	0.00	11.33	2.53	0.00	29.88	6.67
Employment (in '000)	15091.85	0.00	634.36	4.20	0.00	1129.19	7.48	0.00	1353.17	8.97

Source: Author's Calculation

Figure 5.1 is the graphical representation of the impacts presented in table 5.10.

Furthermore, table 5.11 shows the sector-wise and household-wise changes in production

and income due to the implementation of three types of land reform policies. In simulation 1, the distributive land reform policy creates shock on large, marginal and landless households. Similarly, as mentioned in model section exogenous change in household land endowment will bring change in land input resulting land endowment and land inputs will be the same after implementation of land reform policy. This is because the land left unused as a share of household land endowment will transfer to land input. Therefore, the shock is seen on land input too.

Since, large households in all three regions have beyond current ceiling land; implementation of distributive land reform policy will bring them negative shock in their income while in case of landless and marginal households in all three regions, this type of land reform brings positive shock on their income.

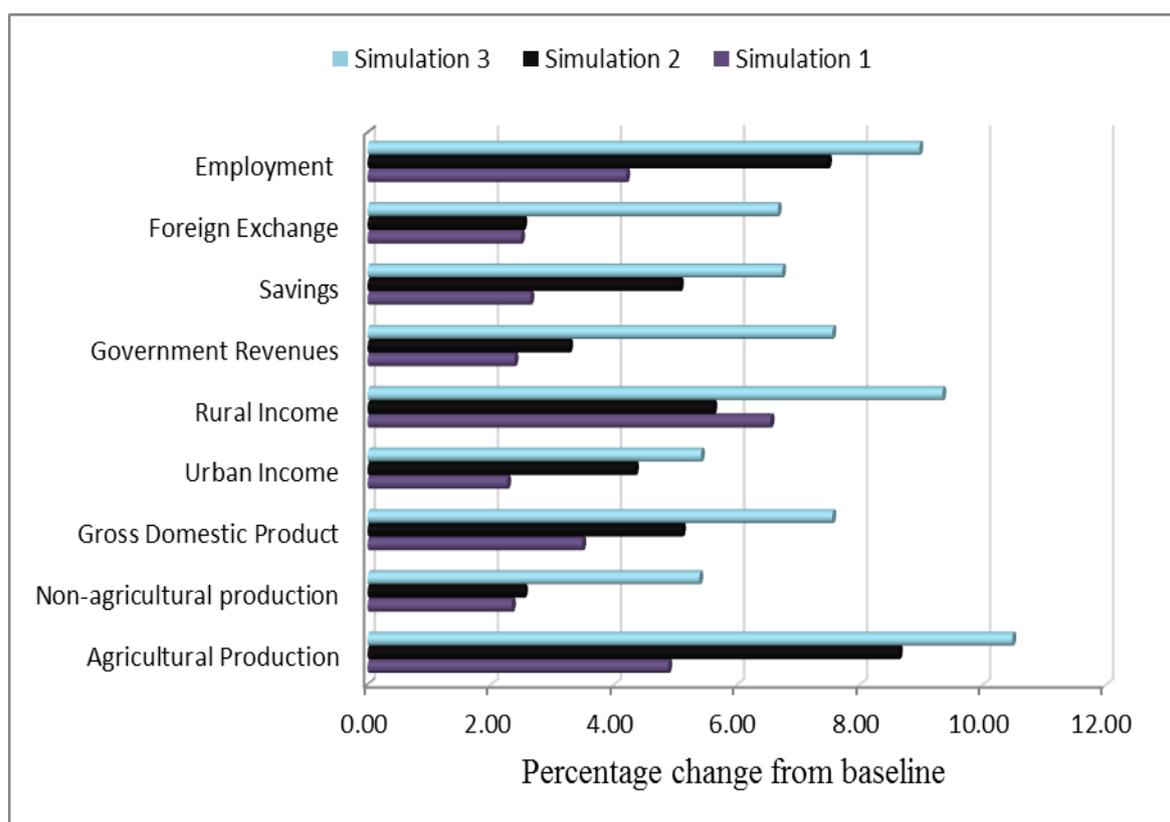


Figure 5. 1: Direct and Induced Impacts of Different Simulations

Simulation 2 in table 5.11 is the impact of 10% increase in agricultural production of crops. In this simulation, we can see the shock in the production of paddy, wheat and other

grains and crops. By the multiplier effect, this shock will bring positive changes in all sectors and households, mentionable are land input (7.82% increases), labor (6.46% increases), total household income increases by 5.14%.

Table 5. 11: Impact of Land Reform on Production and Income

S.N	Sectors	Baseline Values (Billions Rupees)	Simulation 1		Simulation 2			Simulation 3			
			Shock	Change		Shock	Change		Shock	Change	
				Value	%		Value	%		Value	%
1	Paddy	113.74	0.00	5.31	4.67	11.37	11.37	10.00	11.37	11.37	10.00
2	Wheat	31.58	0.00	1.76	5.57	3.16	3.16	10.00	3.16	3.16	10.00
3	Other grains & crops	347.33	0.00	17.41	5.01	34.73	34.73	10.00	34.73	34.73	10.00
4	Livestock & fishery	212.41	0.00	10.12	4.76	0.00	12.52	5.89	0.00	25.41	11.96
5	Forestry	17.38	0.00	0.69	3.95	0.00	0.58	3.32	0.00	1.01	5.82
6	Mining & quarrying	7.46	0.00	0.05	0.70	0.00	0.07	0.92	0.00	0.09	1.17
7	Food processing	98.09	0.00	3.89	3.97	0.00	3.76	3.83	0.00	9.19	9.37
8	Other manufacturing	160.69	0.00	2.15	1.34	0.00	2.74	1.70	0.00	9.18	5.71
9	Public utility	34.06	0.00	0.48	1.40	0.00	0.68	2.01	0.00	3.76	11.02
10	construction	259.17	0.00	1.55	0.60	0.00	1.55	0.60	0.00	4.72	1.82
11	Services	844.11	0.00	24.79	2.94	0.00	26.87	3.18	0.00	48.75	5.78
12	Labor	505.03	0.00	18.19	3.60	0.00	32.62	6.46	0.00	41.19	8.16
13	Capital	556.03	0.00	17.26	3.10	0.00	31.37	5.64	0.00	48.04	8.64
14	Land	192.48	0.00	9.57	4.97	0.00	15.05	7.82	0.00	20.05	10.42
15	Firms	688.66	0.00	19.71	2.86	0.00	36.16	5.25	0.00	51.85	7.53
16	Urban poor-KTM	1.50	0.00	0.04	2.79	0.00	0.08	5.08	0.00	0.11	7.06
17	Urban poor-Terai	6.68	0.00	0.21	3.12	0.00	0.40	5.95	0.00	0.51	7.61
18	Urban poor-Others	2.26	0.00	0.07	3.16	0.00	0.13	5.92	0.00	0.18	7.78
19	Urban medium-KTM	12.38	0.00	0.36	2.90	0.00	0.66	5.35	0.00	0.91	7.32
20	Urban medium-Terai	137.73	0.00	3.32	2.41	0.00	6.53	4.74	0.00	7.63	5.54
21	Urban medium-	147.07	0.00	3.44	2.34	0.00	6.58	4.48	0.00	8.03	5.46
22	Urban rich-KTM	12.96	0.00	0.38	2.96	0.00	0.71	5.46	0.00	0.97	7.50
23	Urban rich-Terai	33.87	0.00	0.83	2.44	0.00	1.55	4.58	0.00	2.05	6.05
24	Urban rich-Others	131.54	0.00	2.36	1.80	0.00	4.47	3.40	0.00	5.95	4.52
25	Rural landless-KTM	0.68	0.29	0.29	41.99	0.00	0.04	5.14	0.29	0.29	41.99
26	Rural landless-Terai	59.60	24.56	24.56	41.21	0.00	3.05	5.11	24.56	24.56	41.21
27	Rural landless-Others	12.02	4.71	4.71	39.15	0.00	0.62	5.19	4.71	4.71	39.15
28	Rural marginal-KTM	2.26	0.63	0.63	27.80	0.00	0.04	1.55	0.63	0.63	27.80
29	Rural marginal-Terai	97.67	7.88	7.88	8.07	0.00	5.31	5.44	7.88	7.88	8.07
30	Rural marginal -	35.38	2.35	2.35	6.63	0.00	1.83	5.18	2.35	2.35	6.63
31	Rural small-KTM	15.34	0.00	0.50	3.28	0.00	0.94	6.14	0.00	1.19	7.79
32	Rural small-Terai	210.07	0.00	6.35	3.02	0.00	12.31	5.86	0.00	14.73	7.01
33	Rural small-Others	237.04	0.00	7.36	3.11	0.00	14.00	5.91	0.00	17.25	7.28
34	Rural medium-KTM	4.56	0.00	0.12	2.70	0.00	0.23	4.97	0.00	0.30	6.61
35	Rural medium-Terai	32.15	0.00	0.82	2.55	0.00	1.59	4.95	0.00	2.02	6.29
36	Rural medium-Others	63.33	0.00	1.79	2.83	0.00	3.44	5.42	0.00	4.36	6.88
37	Rural large-KTM	1.47	-0.07	-0.07	-4.54	0.00	0.07	4.99	-0.07	-0.07	-4.54
38	Rural large- Terai	27.43	-2.37	-2.37	-8.65	0.00	1.63	5.96	-2.37	-2.37	-8.65
39	Rural large-Others	20.99	-1.24	-1.24	-5.89	0.00	0.97	4.61	-1.24	-1.24	-5.89

Source: Author's Calculation

In simulation 3, both types of shocks are present and the impact in production and income is larger. This policy option is the best among three in terms of increasing both production and income.

The graphical representations of the impacts of simulations presented in table 5.11 are presented in figures 5.2, 5.3 and 5.4. Figure 5.2 shows the impacts on sectoral production, figure 5.3 shows the impacts on factors income and figure 5.4 shows the impacts on households income.

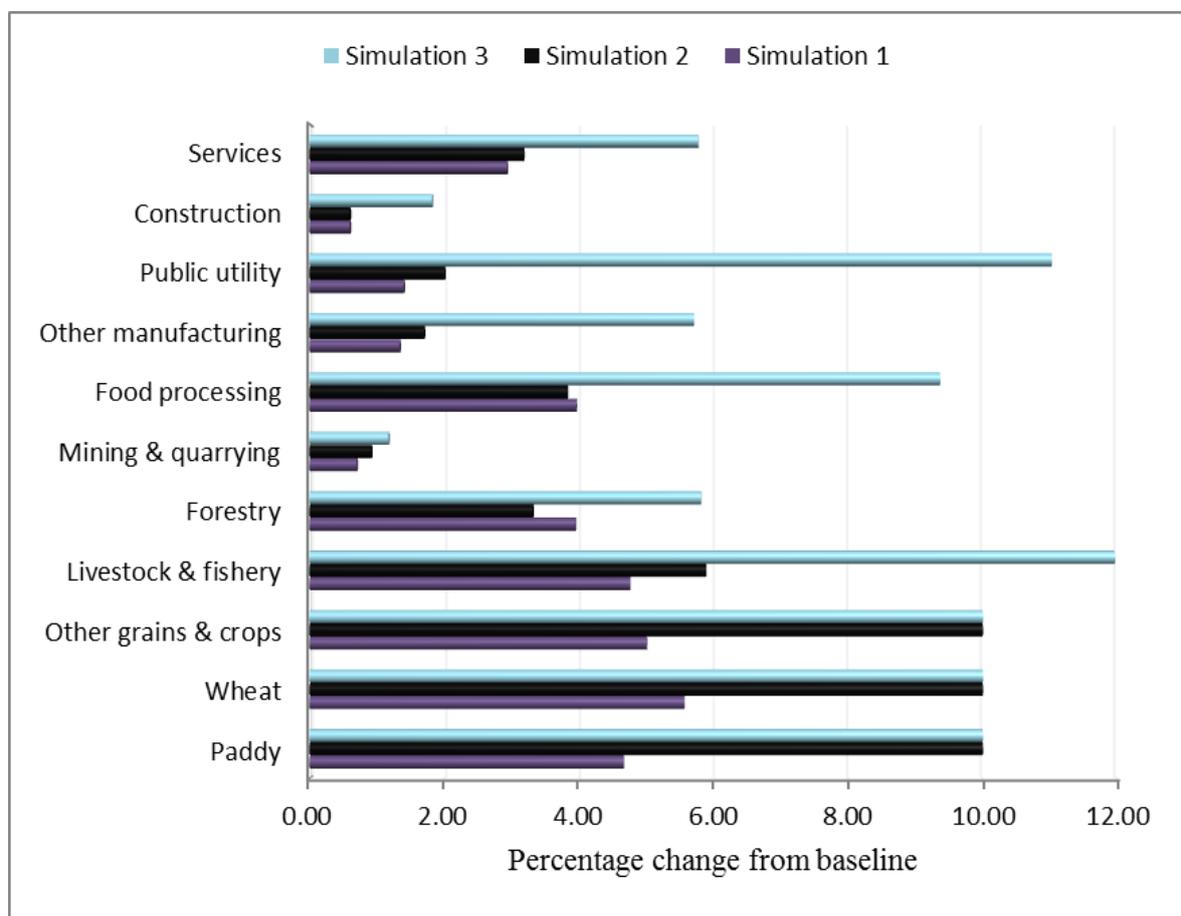


Figure 5. 2: Impacts on Sectoral Production

In Figure 5.2, paddy, wheat and other grains and crops sectors are kept exogenous in simulations 2 and 3 and they have constant impacts of 10% while other have variable impacts. Figure 5.3 shows the impacts of factor income. In all simulations, we can see the higher impacts on land factor. In simulation 1, labor factor has higher impacts than capital. Similarly, Figure 5.4 shows that in simulations 1 and 3 landless, marginal and large

households are kept exogenous while in simulation 2 all households were endogenous which we can see in figure as the same effects in the two simulations.

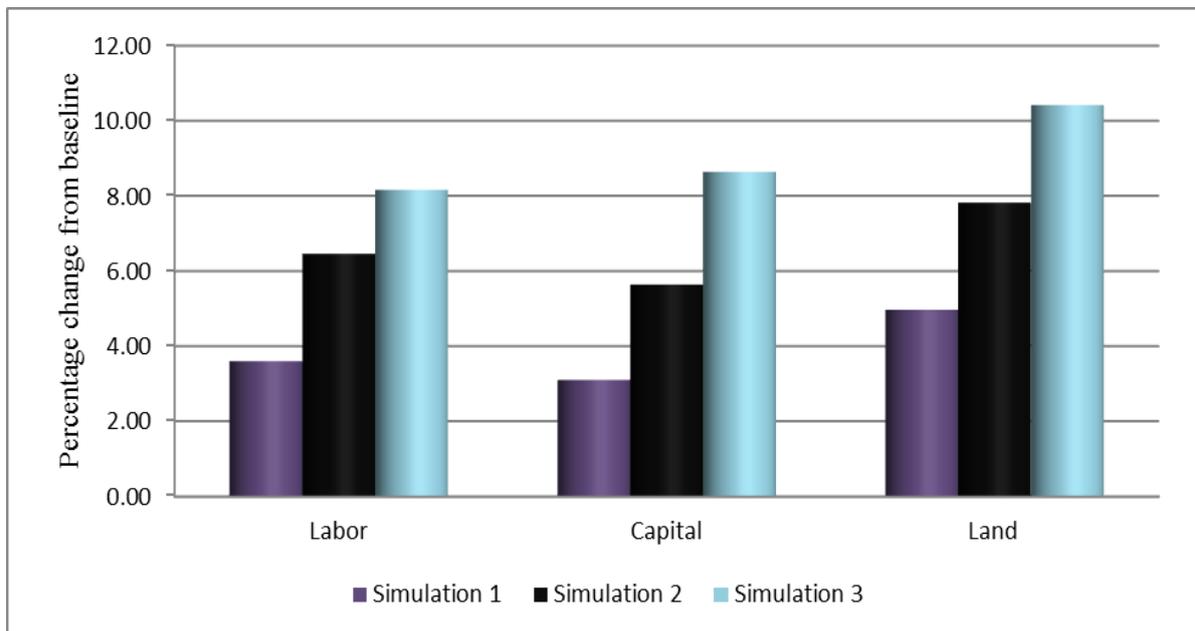


Figure 5. 3: Impacts on Factors Income

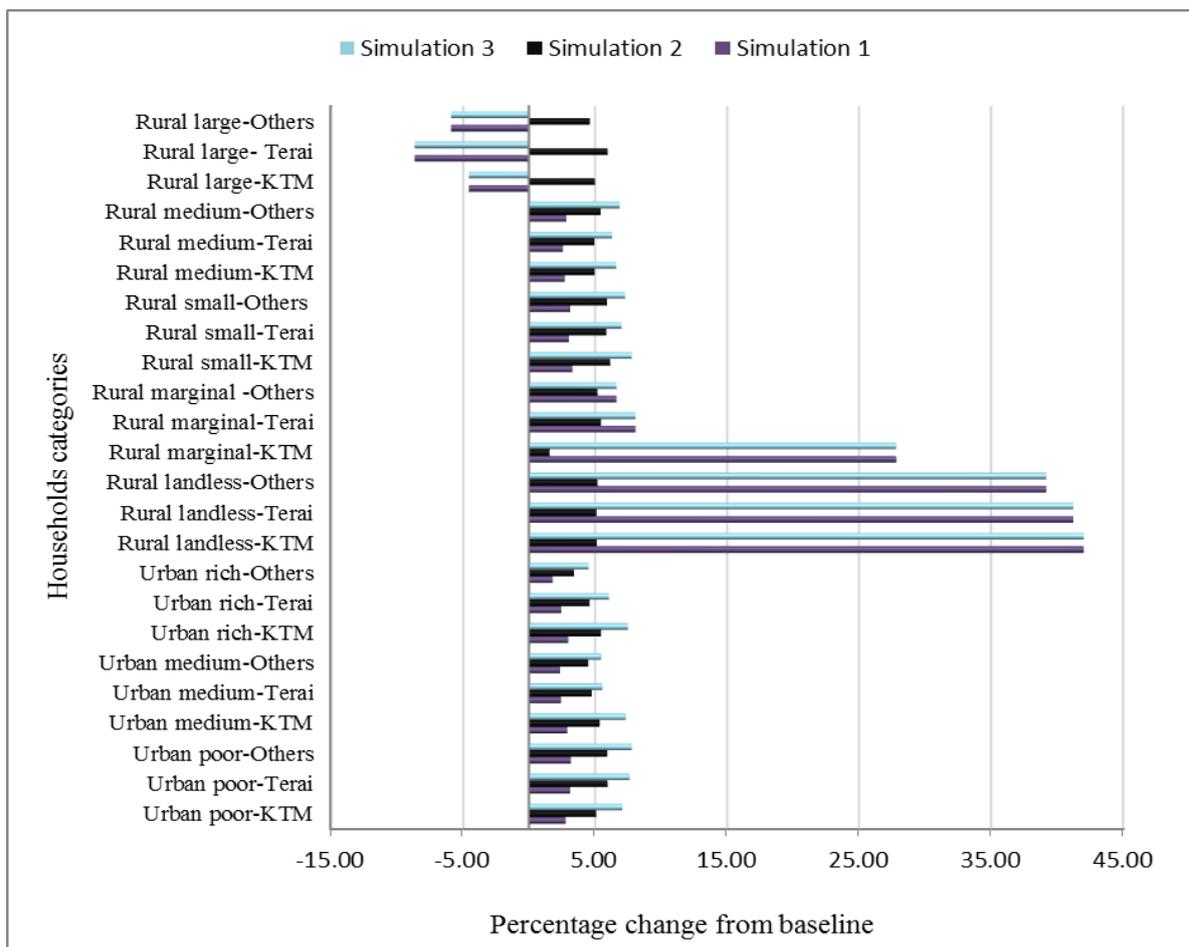


Figure 5. 4: Impacts on Households Income

The above mentioned policy alternatives of land reform increase household income, factor income and, sectoral production causing Nepalese economy to achieve higher economic growth rate. As the economy will grow and the distribution pattern changes, what may be the impact on poverty and inequality? The income of landless and marginal households will increase as the result of transfer of land ownership and it will help to reduce poverty and achieve equity. We have seen from simulation results that economy grows substantially. Moreover, the results of inequality analysis before and after all three types of reforms policies are presented in table 5.12.

Since, this result is based on only the 24 categories of households and their size, the estimated coefficients are little bit different from those using household level survey data in chapter 3 but they are comparable for policy changes. Moreover, in the redistributive reform (simulation 1 and simulation 3), landless households will acquire redistributed land and they will not be landless anymore. Instead, they will fall in the category of marginal households. Similarly, the large households will lose their beyond ceiling land and fall in the category of medium households.

Table 5. 12: Change in Income Inequality Due to Land Reform

Inequality Measures	Baseline	Simulation 1	Simulation 2	Simulation 3
Gini Coefficient	0.31 (0.07)	0.25 (0.06)	0.31 (0.07)	0.25 (0.06)
Theil Index	0.18 (0.06)	0.13 (0.05)	0.18 (0.06)	0.13 (0.05)
Coefficient of Variation	0.55 (0.11)	0.45 (0.10)	0.55 (0.11)	0.46 (0.10)

Source: Author's Estimation

Note: Standard error of estimate in (), calculated at 95% confidence interval.

In baseline, Gini coefficient is 0.31, Theil index is 0.18 and coefficient of variation is 0.55 (see table 5.12). As the implementation of distributive land reform, inequality reduces in simulation 1 but in case of 10% productivity augmenting reform, inequality does

not change. If both reforms are implemented together, inequality reduces as similar in the case of distributive reform policy.

Redistributive land reform reduces inequality but efficiency augmenting reform will keep inequality level same. In simulation 1, equity will be achieved. In simulation 2, efficiency will be gained by keeping same level of equity. In simulation 3, both equity and efficiency are gained together. In theory, there may be trade-off between equity and efficiency. However, in the implementation of all three alternative options, no trade-off between equity and efficiency are found. Therefore, land reform in Nepal has both equity and efficiency aspects together with large impact on economy.

5.6 Conclusion

In this chapter, a fresh Nepal SAM 2010 is estimated and used to study the impact of land reform in Nepalese economy. Using SAM framework and making three simulation scenarios such as redistributive land reform, productivity augmenting land reform and implementing both simultaneously, the impacts of land reform on Nepalese economy are studied. Furthermore, the impacts of alternative policies of land reform in Nepal are investigated, which could have on agricultural output, non-agricultural output, GDP, urban and rural households' income, production of different sectors, government revenues, savings, foreign exchange and employment.

Redistributive land reform increases income level of poor households and reduces inequality. Productivity augmenting reform has more impact on economy as it increases productivity of all sectors of economy including income of all households. In the same time, it will keep the inequality level unchanged. Furthermore, implementing both types of reforms simultaneously produce huge impact on Nepalese economy by gaining both equity and efficiency. Therefore, both types of reforms are important in Nepalese case. The former

increase equity while the later increases efficiency. Both will increase household welfare and the size of Nepalese economy. Therefore, it is recommended that both types of reform should be implemented simultaneously in Nepal to reduce poverty, inequality and to achieve pro-poor economic growth.

Furthermore, SAM based general equilibrium model gives more precise impact assessment of policy alternatives in an economy than input-output model. However, in SAM model price is assumed constant and exogenous. This type of fixed price model does not capture the substitution effects. In addition, in SAM model, some sectors must be kept exogenous. This has disadvantage of over calculation of change in income, output and other variables. In contrary, computable general equilibrium (CGE) model assumes price as endogenous and captures the substitution effects. Moreover, in CGE model, all sectors are assumed endogenous; labor market is cleared and may give micro-economic consistent effects of policy. Therefore, to overcome the bottlenecks that arise in SAM framework, it is further suggested to use computable general equilibrium (CGE) modeling framework to study the impact of alternative policy scenarios of land reform in Nepal, which is also the topic for our further research.

Appendix 5A: An Input-Output Approach of Land Reform

5A.1. Introduction

Nepal is a small open economy situated in the South Asian Himalayan region. Sandwiched between two Asian giants, India and China, the country is one of the poorest countries in the world with low per capita income, low level of infrastructure, low industrialization, and low level of human capital and high share of agriculture in the economy. Data show that in fiscal year 2010, 36.5% of gross domestic product (GDP) comes from agriculture, 13.8% from trading, 6.2% from manufacturing and 42.60% from different types of services including public utilities, transportation, communication, financial intermediaries, hotels, renting, government and other services (Ministry of Finance, 2013). This shows that Nepalese economy is still dominated by agricultural sector.

The government of Nepal central bureau of statistics (CBS) publishes system of national accounts (SNA) in an annual basis but the government has not published input-output (IO) table until present. This means that there is no official input-output table of Nepal. Only few studies are carried out based on IO table and social accounting matrix (SAM) of Nepal. When using computable general equilibrium (CGE) approach to analyze different aspects of Nepalese economy, SAM is required and SAM is further based on its homologue IO table. This reveals that IO table for Nepal is very important for policy studies. However, Nepal is included in the eighth version of Global Trade Analysis Project (GTAP) database, the estimation of IO table for Nepal and its use for policy analysis may have great importance for policy makers, researchers and other concerned persons. Keeping this in mind, here the author estimates a fresh IO table for Nepal. Before entering the topics of estimation of IO table, it is worth to mention about the development and structure of IO table in brief.

Wassily Wassilyovich Leontief originally contributed input-output table and as recognition of his works, he won Nobel Prize in Economic Sciences in 1973. Leon Walrus and his theory of general equilibrium and Francois Quesnay and his Tableau Economique influenced Leontief. Later on, he developed linear activity model of general equilibrium. Developing input-output table as interdependencies of different sectors of economy, Leontief used matrix representation of economy where the sum of each row corresponds to each column for each industries. In an input-output table, we can see the inter-industry inflow and outflow of goods and services in the form of input used and output supply by different industries or sectors. The columns represent the expenditures for input used and the rows the receipts from output supply. In overall, the total demand for output must be equal to total supply of inputs, which is the total domestic output. An input-output model can be written in matrix notation as follows:

$$(5A.1) \quad \mathbf{AX} + \mathbf{F} = \mathbf{X}$$

Where, \mathbf{A} : matrix of coefficients showing the ratio of input X_{ij} to total output X_j

\mathbf{X} : the vector of sectoral total output

\mathbf{F} : the column vector of total final demands

From equation (5A.1),

$$(5A.2) \quad \mathbf{X} = (\mathbf{I} - \mathbf{A})^{-1} \mathbf{F}$$

Where, $(\mathbf{I} - \mathbf{A})^{-1}$: Leontif inverse matrix or input requirement matrix

\mathbf{I} : an identity matrix

Study of economic structure or impact analysis using IO framework is common in literature. Many developed as well as developing countries have their own input-output table constructed and updated in some interval of time. In Asian region, most of the countries have successfully compiled and updated IO table in every five years (Thwin et al, 2010). According to Leontief (1966), input-output analysis is a method of analysis that takes advantage of the relatively stable pattern of the flow of goods and services among the

elements of economy to bring a much more detailed statistical picture of the system into the range of manipulation by economic theory. IO analysis is very crucial for policy makers to understand the whole structure of the economy and the flow of goods and services within the different sectors of an economy producing multiplier effects. These multiplier effects due to the tight linkage among sectors induce production or enhance consumption in an economy.

Additionally, for making national policies, one should know about the impact of past policies or the possible impact of future policies. Analyzing the structure of economy and knowing the inter-relationship between different sectors of economy enhances the confidence of policy maker to choose best alternative from the bunch of policies. The success or failure of a policy depends upon the information gathered by policy maker and his/her capacity for analyzing and choosing best policy options. Application of input-output framework for analysis is a one which can provide better alternatives for the economic policy makers. To apply input-output framework, we require input-output table of an economy. Nepal being exception for not constructing official input-output table, the main objective of this study is to estimate new input-output table and use it to know the impact of land reform policy in Nepalese economy.

The originality of this study is as follows: a fresh input-output table for Nepal is estimated. In this table, household sector is extended based on socio-economic status of households in different 24 groups. Furthermore, the impact of two types of land reform is studied in this appendix based on households land ownership status and change in efficiency of farmers. The first one is due to land reform implementation there will be transfer of income from large land holding households to landless and marginal land holding households. The second is the impact of productivity increase (due to the technical efficiency increase) in agriculture on productivity of other sectors and in the economy. To

the best of our knowledge, there are no any studies similar to this one. Therefore, the method adopted in this study can be applied in many other cases of land reform in developing countries, which is the originality of this paper.

5A.2. An Estimation of New Input-Output Table for Nepal

5A.2.1. Circumstances

System of national accounts (SNA) is published in an annual basis in Nepal, which shows the information regarding expenditures and incomes from different sources. SNA also displays the payment to the factors and the gross value added in the economy. Consumption, production and the transactions to the rest of the world are also contained in the SNA. In case of Nepal, SNA is published by CBS, a government agency under national planning commission (NPC) but they do not publish the IO table, which may be used to estimate SNA. This means that there is no official IO table of Nepal published yet. Therefore, researchers and policy makers do not get any information about IO table of Nepal. If somebody wants to use CGE analysis for simulation based policy studies in Nepal, he/she either should rely of GTAP database and extract IO table from there or end up quitting the research project.

In literature, some older versions of Nepal IO tables are found, which are used in some studies. For example, Sapkota & Sharma (1998) mentioned about two IO tables of Nepal in their study but the tables themselves are not available. They mentioned that the first IO table of Nepal was prepared for the year 1986/87 by Development Study Consultants (DSC) with support of United Nations Industrial Development Organization (UNIDO) in 1991 which was with 39 sectors. Later on in 1992, NPC disaggregated this into 43 sectors and prepared extended IO table. Bhattarai (2007) used IO table for Nepal 1999 which is of 9 sectors and available in his study. Off course, previous studies and GTAP

database are valuable information for researches; a fresh IO table of Nepal for 2010/11 is estimated in this study. In fact, the available information from different surveys and published sources and use input-output coefficients from previous tables for inter-industry transaction are also used to estimate intermediate inputs for some sectors. Furthermore, final demand and value added are estimated based on latest household survey (Central Bureau of Statistics, 2011a), Nepal labor force survey (Central Bureau of Statistics, 2008) and published trade statistics from trade and export promotion center database (Ministry of Commerce and Supply 2013).

5A.2.2. Data Requirement

To estimate new input-output table, non-survey method is used, i.e., secondary data published by different sources. In Nepal, the fiscal year starts in mid-July and ends in mid-June of next year. Here IO table is estimated that covers period of one fiscal year starting from mid-July 2010 to mid-July 2011. For the purpose of estimation of IO, this year is selected for some reasons. The most important reason is that it is the most recent year in which all necessary information is available. Among other reasons, the first one is that SNA is available for 2010/11, the second is that factors income and household consumption expenditure are linked to household level information for which the latest Nepal living standard survey 2010/11 is available in the same year, the third reason is national population census was also carried out in 2010/11 which is very helpful to extrapolate the household level data into national level, the fourth is trade statistics are also available for 2010/11, fifth many other information published by different government agencies such as agricultural statistics of Nepal (Ministry of Agriculture and Development, 2012) are also available for 2010/11. Since, availability of information is very important to estimate IO table, the year

2010/11 is selected for benchmark. Furthermore, the followings are the major sources of data for estimation of IO table for Nepal.

- i. The system of national accounts –SNA (Central Bureau of Statistics, 2013b)
- ii. Economic survey (Ministry of Finance, 2013)
- iii. Agricultural statistics of Nepal (Ministry of Agriculture and Development, 2012)
- iv. Trade overseas trade statistics (Ministry of Commerce and Supply, 2013)
- v. Nepal living standard survey 2010/11 (Central Bureau of Statistics, 2011a)
- vi. Nepal labor force survey 2008 (Central Bureau of Statistics, 2008)
- vii. National report on population and housing census (Central Bureau of Statistics, 2012)
- viii. GTAP database (GTAP, 2012)
- ix. IO table for Nepal 1999 (Bhattarai, 2007)
- x. SAM for Nepal for 2007 (Raihan & Khondker, 2011)

5A.2.3. Estimation Procedure

At the beginning, using SNA, the Macro IO table is estimated (see table 5A.1). The sum of total input (S) and total output (D) must be equal in this table which is 2,112.42 billion Nepalese Rupees.

Table 5A. 1: Macro Input-Output Table of Nepal for 2010/11 (in Billions Rupees)

	1	2	3	4	5	6
	Sectors		Final Demands			Total Output
	IC	C	G	I	X-M	D
1 Sectors	(737.47)	(1,085.73)	(138.43)	(471.66)	(-320.87)	(2,112.42)
	VA					
2 Factors	(1,253.43)					
	IDT					
3 Indirect taxes	(121.42)					
	S					
4 Total Input	(2,112.42)					

Source: Author's Estimation Based on System of National Accounts (Central Bureau of Statistics, 2013b)

Note: IC=intermediate consumption, C=private consumption, G=government consumption, I=investment, X-M=net exports, VA=value added, IDT= indirect taxes

The main objective is to estimate IO table of Nepal for the year 2010/11 focusing the nature and importance of different sectors in Nepalese economy. As already mentioned,

agriculture is the backbone of Nepalese economy and without development of agriculture and manufacturing sectors together, it is almost impossible for Nepalese economy to be structurally transformed. Therefore, while constructing IO table due importance is given to these two sectors and disaggregate the agriculture into 12 sectors and manufacturing into 11 sectors and other 13 sectors for which transactions can be easily deduced from available information. Similarly, for detail study of household economy, households are disaggregated into 24 different socio-economic groups based on income, land assets and regional basis. The disaggregation of sectors is shown in table 5A.2.

Some of the sectoral information of agricultural sectors such as paddy, wheat, etc., their intermediate consumption and value added are obtained from agricultural statistics of Nepal. Checking the input-output coefficients for other sectors with Raihan and Khondker (2011), input structures are established. For private consumption of households, the households are disaggregated into 24 groups and estimate their final consumption of different 36 sectors based on consumption expenditure from Nepal living standard survey 2010/11. Based on the sample size of households, the information is extrapolated into national level using total households information from national report on population census 2010/11. Imports and exports of different sectors is taken from the database of Ministry of Commerce and Supply (2013) and further matched this information with the information about imports and exports from Economic Survey (Ministry of Finance, 2013).

For value added, the factors of productions are divided into labor, capital and land. Their share is taken from SNA and then factor income from different sectors is estimated based on Nepal living standard survey 2010/11 and unit labor costs are checked with Nepal labor force survey 2008. Their coefficients are also matched with Raihan and Khondker (2011) and IO table of Nepal 1999. The indirect taxes are estimated by using the

information from economic Survey. Indirect tax consists of value added tax (VAT), excise duty and taxes on customs (import tariff).

Table 5A. 2: Disaggregation into Different Categories and Sectors

11 Sector classification		36 Sector classification		Sector Definition
Code	Description	Code	Description	
1	Paddy	1	Paddy	Different kinds of paddy and rice
2	Wheat	2	Wheat	Wheat
3	Other grains and crops	3	Other grains	Maize, millet, buckwheat etc.
		4	Vegetables and fruits	All kinds of vegetables and fruits
		5	Oilseed	Mustard, soybean, canola, sunflower etc.
		6	Sugarcane	Sugarcane
		7	Jute and plant fibers	Jute, other fibrous plants
		8	Other crops	Pulses, beans, etc.
4	Livestock and fishery	9	Cattle	Cow, buffaloes
		10	Other animal product	Goat, sheep, pig, chicken etc.
		11	Raw milk	Cow, buffalo and goat milk
		12	Wool	Different kinds of wool
		13	Fishery	Different kinds of fish
5	Forestry	14	Forestry	Forest related products
6	Mining and quarrying	15	Mining and quarrying	Coal and other mining
7	Food processing	16	Grain milling	Milling of rice, wheat and other grains
		17	Meat processing	Processing of different kinds of meat
		18	Cooking oil	Making oil from different oilseeds
		19	Dairy product	Ghee, butter, cheese, processed milk etc.
		20	Other food product	Processing of pulses, vegetables, pickles etc.
		21	Beverage and tobacco	Alcoholic and non-alcoholic and tobaccos
8	Other manufacturing	22	Petroleum chemical	All kinds of petroleum products and chemicals
		23	Metal	Steel, iron, zinc, tin, copper etc.
		24	Vehicle and machinery	Vehicles, machinery and instruments
		25	Textile and apparels	All kinds of textiles and apparels
		26	Other manufacturing	Rest of all manufacturing products
9	Public utility	27	Public utility	Electricity, water, gas
10	Construction	28	Construction	Construction works
11	Services	29	Trading	Wholesale and retail trade
		30	Hotels and restaurants	Hotels, resorts, restaurants etc.
		31	Transportation	Land, air and water transportation
		32	Communication	Media, internet, telecommunication etc.
		33	Financial intermediaries	Banking, insurance, cooperative and related services
		34	Real state and renting	Real state, renting services
		35	Government services	Health, education services etc.
		36	Other services	Community, social and personal services

Source: Author

After estimation of the values of each sector and each category, the difficult part is to make it consistent with SNA and balance between the sectors of national economy. It is

required to do many exercises on hit and trial basis. Finally, the IO matrix is balanced by using either cross entropy methods or RAS matrix balancing algorithms. Here balancing is done using both methods with SimSIP SAM (Parra and Wodon 2009) and found that the results are almost similar. Therefore, the IO table balanced using RAS methods is only displayed in this study.

In this study, originally 36 sectors IO table with 24 household categories for private consumption is estimated but due to space limit only aggregated version of the table is shown. However, all the analyses are based on 36 sectors disaggregated version. For detail sectoral structure of both versions of IO table for Nepal 2010/11 see table 5A.2 and for estimated aggregated version of IO table see table 5A.3.

Table 5A. 3: Estimated Input-Output Table of Nepal 2010/11 (11 Sector Classification)

Rs in billions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Sectors	Paddy	Wheat	Other grains & crops	Livestock & fishery	Forestry	Mining & quarrying	Food processing	Other manufacturing	Public utility	construction	Services	Intermediate consumption	Households consumption	Government consumption	Investment	Export	Import	Net Export	Total output
1 Paddy	11.06	0.00	0.00	16.88	0.00	0.00	34.75	0.00	0.00	0.00	0.00	62.68	46.51	0.00	4.52	0.03	1.51	-1.48	112.24
2 Wheat	0.00	2.90	0.00	0.00	0.00	0.00	2.11	0.00	0.00	0.00	0.00	5.00	24.82	0.00	1.23	0.53	1.56	-1.04	30.02
3 Other grains & crops	0.00	0.00	44.25	0.00	0.00	0.00	16.02	3.46	0.00	0.00	10.58	74.32	263.99	0.00	8.41	4.84	14.38	-9.54	337.17
4 Livestock & fishery	1.03	0.66	8.84	35.57	0.00	0.00	8.91	3.58	0.00	0.00	0.00	58.59	147.88	0.00	4.42	1.64	4.54	-2.91	207.99
5 Forestry	0.00	0.00	0.00	0.00	0.26	0.00	0.00	6.55	0.00	0.22	0.00	7.03	9.33	0.00	0.61	0.41	0.06	0.36	17.33
6 Mining & quarrying	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.07	0.03	0.00	0.00	0.22	2.06	0.00	9.33	0.49	4.92	-4.43	7.17
7 Food processing	0.00	0.00	0.00	37.58	0.00	0.00	5.32	0.22	0.00	0.00	20.50	63.62	60.51	0.00	7.64	24.87	56.45	-31.58	100.19
8 Other manufacturing	0.34	0.39	3.71	3.00	0.00	0.01	0.51	35.62	1.62	11.84	49.30	106.33	81.01	0.00	117.73	53.57	202.23	-148.66	156.41
9 Public utility	0.34	0.11	1.04	0.33	0.06	0.10	0.53	0.42	1.53	36.11	3.54	44.11	8.40	0.00	5.63	0.00	24.81	-24.81	33.34
10 construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.31	0.00	254.56	0.00	31.01	-31.01	256.85
11 Services	2.69	0.23	10.21	20.02	1.50	0.79	3.82	35.35	7.47	112.44	121.05	315.57	407.91	138.43	57.57	41.01	106.77	-65.76	853.71
12 Domestic inputs	15.46	4.30	68.05	113.37	1.82	1.01	71.98	85.27	10.65	160.61	204.97	737.47	1085.73	138.43	471.65	127.38	448.25	-320.86	2112.42
13 Labor	60.93	15.92	122.32	38.95	7.91	2.05	2.58	7.20	2.00	16.70	228.46	505.03							
14 Capital	9.86	4.59	27.20	11.51	7.54	3.87	12.58	23.47	16.59	74.16	364.66	556.03							
15 Land	25.94	5.18	117.41	43.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	192.48							
16 Indirect taxes	0.04	0.04	2.19	0.21	0.06	0.24	13.06	40.47	4.11	5.39	55.61	121.41							
17 Value Added	96.78	25.72	269.12	94.62	15.51	6.16	28.22	71.14	22.70	96.25	648.74	1374.95							
18 Total Inputs	112.24	30.02	337.17	207.99	17.33	7.17	100.19	156.41	33.34	256.85	853.71	2112.42							

Source: Author's Estimation

5A.2.4. Output and Value Added Multipliers

Table 5A.4 shows the estimated coefficients of output multipliers and value added multipliers for each sector. The output multiplier is the sum of column vector of Leontief inverse matrix. Output multiplier shows the power of induced production. Value added multiplier is the sum of column vector of Leontief inverse matrix multiplied by the value added ratio of each sector. Value added multiplier indicates how much value added is induced by one unit of final demand in each sector. Figure 1 shows the scatter diagram of relationship between value added multiplier in vertical axis and output multiplier in horizontal axis.

Table 5A. 4: Value Added and Output Multipliers

Sector No.	Sector	Output multiplier	Value added multiplier	Sector No.	Sector	Output multiplier	Value added multiplier
1	Paddy	1.15	0.99	19	Dairy product	1.93	0.79
2	Wheat	1.16	0.99	20	Other food product	1.67	0.68
3	Other grains	1.19	0.99	21	Beverage-tobacco	1.52	0.54
4	Vegetables & fruits	1.24	0.97	22	Petroleum chemical	1.16	0.81
5	Oilseed	1.24	0.95	23	Metal	1.39	0.68
6	Sugarcane	1.26	0.98	24	Vehicles & machinery	1.07	0.94
7	Jute & fibers	1.24	0.99	25	Textile & apparels	1.60	0.58
8	Other crops	1.24	1.00	26	Other manufacturing	1.84	0.46
9	Cattle	1.67	0.72	27	Public utility	1.28	0.87
10	Other animal product	1.94	1.00	28	Construction	1.69	0.63
11	Raw milk	1.73	0.75	29	Trading	1.07	1.00
12	Wool	1.20	0.85	30	Hotels and restaurants	1.55	0.63
13	Forestry	1.10	0.98	31	Transportation	1.13	0.97
14	Fishing	1.27	0.50	32	Communication	1.64	0.62
15	Mining & quarrying	1.13	0.97	33	Financial intermediary	1.15	0.95
16	Grain milling	1.89	0.41	34	Real state & renting	1.05	0.99
17	Meat processing	2.07	0.79	35	Government services	1.36	0.90
18	Cooking oil	1.88	0.31	36	Other services	1.41	0.78

Source: Author's Estimation Based on Estimated IO Table of Nepal for 2010/11

From table 5A.4 and figure 5A.1, we see that output multipliers are higher for meat processing (sector 17), other animal products (sector 10), dairy product (sector 19), grain milling (sector 16), cooking oil (sector 18), other manufacturing (sector 26), raw milk (sector 11), construction (sector 28), cattle (sector 9), etc. These sectors have strong power to induce other sectors production and their growth will be accompanied by that of many other sectors (Kobayashi et al 2009). The increase in production of such sectors produces

broad-based economic growth, which can influence the whole economy and is important for poverty reduction.

In contrary, value added multipliers are higher for other animal products (sector 10), other crops (sector 8), trading (sector 29), paddy (sector 1), wheat (sector 2), other grains (sector 3), real state and renting (sector 34), etc. High value added sectors have stronger power to induce the domestic income than other sectors. These sectors may be very important to use as export promotion strategic sectors that can gain larger profit for future investment. These sectors are also crucial for broad based growth in Nepalese economy.

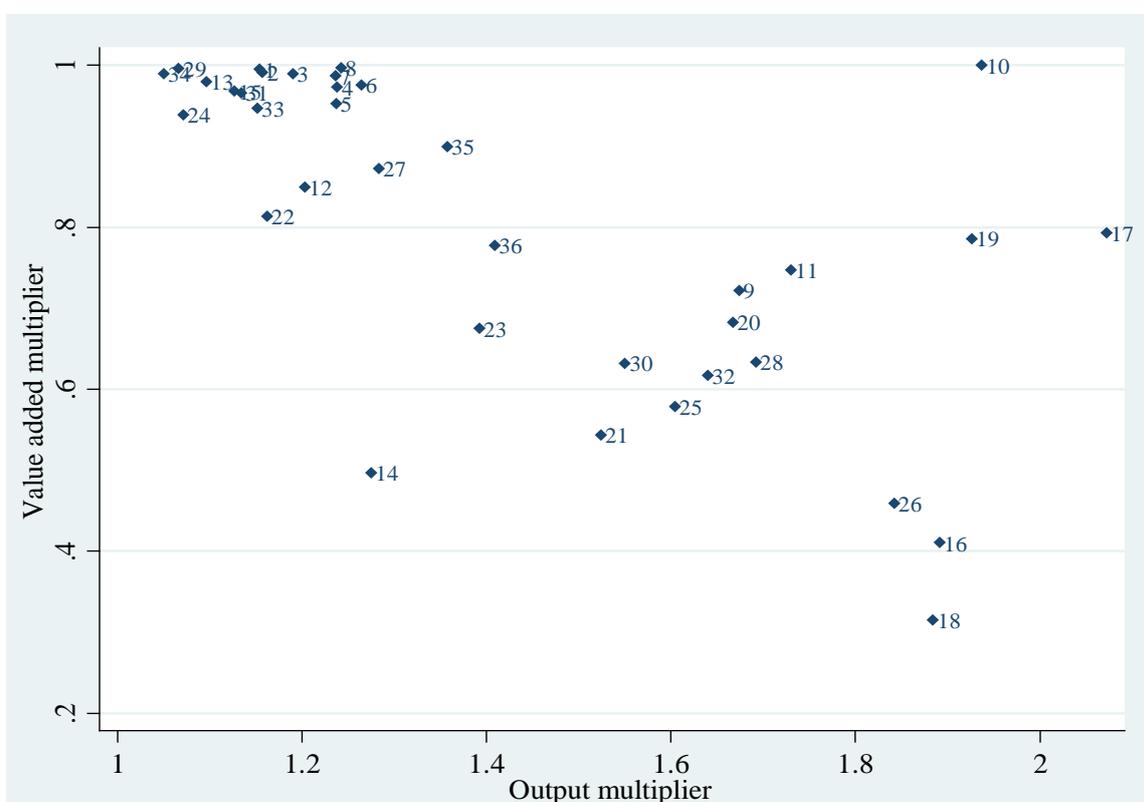


Figure 5A. 1: Value Added and Output Multipliers

Note: Plotted according to sector number, for example paddy (1), other services (36)

The sectors, such as: cooking oil (sector 18), grain milling (sector 16), and other manufacturing (sector 26), and fishing (sector 14) have lower value added among others. Most of the sectors in agricultural category have higher value added than other sectors. This reveals that for economic development and poverty reduction, agriculture is very crucial in Nepal. As most of the poor people rely on agriculture for their livelihood, development of

agriculture has much impact for growth and pro-poor based income distribution in Nepal. From figure 5A.1, we see that the sectors such as: other animal products (sector 10), meat processing (sector 17), dairy products (sector 19), raw milk (sector 11), cattle (sector 9), other food product (sector 20), etc. have both multiplier values relatively higher. These sectors can have power that is more influential in Nepalese economy and can generate pro-poor growth.

Moreover, focusing on more value added products in agriculture by using more investment can enhance the capacity of agriculture. In the long run, the development strategy should focus on structural transformation of economy from agriculture to manufacturing. For structural transformation of the economy, the commercialization of agriculture is needed in which modernization of traditional agriculture can reduce the numbers of agricultural labors. The surplus labors from agriculture can be used in manufacturing sectors to boost the industrialization in the country. Land reform in agriculture by means of making proper land size and transferring land from large holders to small holders, enhancing technical efficiency and productivity of farmers by the use of modern technology can boost agricultural growth. More importantly, farmers' knowledge, skills and training about farming technique can help supply the capital and labor in manufacturing sector contributing reduction in poverty.

5A.3. Impacts of Land Reform

Nepal is a land scarce country. The Northern part (Mountains) is covered by snow with high range of mountains, middle part (Hills) has been affluent with steep slopes and in comparison only the Southern part (Terai) has much productive land. To meet the need of growing population, the agricultural land needs to be managed in a productive way so that the agricultural production goes up and poverty level goes down with improvement of living

standard of rural people. For this, the Government makes land reform laws and implements them time to time. In case of Nepal, the Land Related Act 1964 (Nepal Law Commission 2012) is the momentous law for land reform. It is amended many times and the mentionable amendment is the Fifth Amendment. The Fifth Amendment to the Land Related Act 1964 was done in 2002 (hereafter, FALRA 2002) that drastically reduced the land ceiling in the country aiming to use land in the most productive way (see table 2.4). According to FALRA 2002, land ceiling was reduced by 60% in Terai (from 18.40 hectares to 7.45 hectares), 51% in Kathmandu Valley (from 3.10 hectares to 1.52 hectares) and 22% in all other regions (from 4.90 hectares to 3.81 hectares) including both agricultural and homestead land.

The law made provision of redistributive land reform in favor of poor farmers but the law could not come into force due to many barriers from opposing forces including deficiency of proper implementation of policy. Land reform in Nepal is always being criticized for lack of will power to implement it (Regmi, 1977). Even FALRA 2002 was not properly implemented indicating failed reform on land. The scenario of land distribution would be different if the land ceiling policy of FALRA 2002 were properly implemented. From Nepal living standard survey 2010/11 data, it is identified that 3% households have large plots of land beyond ceiling and 28% households are landless.

Land issues, and more specifically land reform issues are live issues in many developing countries including Nepal (Lipton, 2010) and they are more serious now than decades ago because land reform has not come to a logical end and the story of poverty and inequality is much more complex today. Consequently, using household level survey data in chapter three, it is estimated that how implementation of distributive land reform affects consumption of households.

Moreover, stochastic frontier function for Nepalese agriculture is also estimated. Since, the input information for each sub sectors in agricultural is not available, it is not

possible to estimate stochastic production frontier for each sub-sector. Furthermore, they found that household farms are operating less than frontier and inefficiency sources are common. Furthermore, the gap between frontier and actual production is 30% and mean technical efficiency scores vary widely between household operated land sizes and regions. The landless and large household farms are relatively less efficient in all regions (Terai, Kathmandu and other regions). Farmers with small and medium holdings are relatively more efficient. Moreover, sources of inefficiency are fragmented lands, large size lands, unused idle lands, less educated farmers, less experienced farmers, less extension services, lack of use of modern equipment, lack of year round irrigation, lack of access to agricultural loan, and very small size of household's lands called landless.

Land reform will transfer land from landlords to the landless and marginal farmers who have hard working practices. If the land reform is implemented and the inefficiencies are eliminated, the agricultural productivity would rise even using the same level of inputs. According to table 4.8, mean technical efficiency in Nepalese agriculture is 70%. This implies that if all the inefficiencies were eliminated, the efficiency would be raised up to 30% maximum. In practice, we cannot eliminate all the inefficiencies. Therefore, for simulation purpose, it is assumed that at least 10% productivity can be raised by eliminating some of the inefficiencies.

5A.4. Simulation Methods

In this appendix, two types of simulation are used to study the impact of land reform in Nepal- distributive land reform and technical efficiency augmenting land reform. The first and second (Simulation 1 and Simulation 2) are the impacts of distributive land reform with and without income linkage and the third and fourth (Simulation 3 and Simulation 4) are 10% rise in agricultural production with and without income linkage. Then, the impact

of land reform on the whole Nepalese Economy is evaluated using input-output framework. Moreover, the results of both types of reforms are compared.

I. Distributive Land Reform

In this land reform, the land beyond ceiling of FALRA2002 is transferred to landless and marginal households. This will increase the land size of landless and marginal farmers and decrease the land size of large farmers. This will transfer the income from landlords to landless and near landless (marginal farmers). In this simulation, transfer income is (or consumption) from large land holding households to landless and near landless (marginal) households. In distributive land reform simulation, rural large households will lose their consumption and rural landless and rural marginal households will gain extra consumption. This will affect the final demand of households. For this simulation, we can write from equation (5A. 2) as follows:

$$(5A.3) \quad \Delta X = (I - A)^{-1} \Delta F$$

$$(5A.4) \quad \Delta X = (I - A)^{-1} \sum_{i=1}^{24} \Delta F_i$$

Where, ΔF_i is the change in final demand of each category of households and $i=1 \dots 24$.

Moreover, the impact of redistributive land reform with and without income linkage using input-output framework are calculated respectively in Simulation 1 (S1) and Simulation 2 (S2). It is required to see the difference between the impact of redistributive reform with and without income linkage because the transaction related to land also depends upon income, which is not captured while estimating the change in consumption due to reform.

II. Productivity Augmenting Land Reform

To see the effect of change in production of agricultural sectors (paddy, wheat, other grains, vegetables & fruits, oilseed, sugarcane, jute and other plant fibers, other crops- eight sectors) on gross domestic product (GDP) of other sectors and the whole economy, we see

these eight sectors as exogenous and rest 28 sectors as endogenous. Then the changes in production of each exogenous sector is calculated by 10% without income linkages in Simulation 3 (S3). Again, the changes in production of each exogenous sector is calculated by 10% with income linkages in Simulation 4 (S4). These changes in agricultural production are due to the impact of hypothetical implementation of technical efficiency augmenting land reform measures in Nepalese economy.

The following input-output model with demand, supply identity is used as in equation (5A.1), and rearranged as:

$$(5A.5) \quad \mathbf{X} = \mathbf{AX} + \mathbf{F}$$

Where, $\mathbf{X} = \begin{pmatrix} \mathbf{X}_1 \\ \mathbf{X}_2 \end{pmatrix}$: the vector of sectoral total output

$\mathbf{A} = \begin{pmatrix} \mathbf{A}_{11} & \mathbf{A}_{12} \\ \mathbf{A}_{21} & \mathbf{A}_{22} \end{pmatrix}$: matrix of technical coefficients

$\mathbf{F} = \begin{pmatrix} \mathbf{F}_1 \\ \mathbf{F}_2 \end{pmatrix}$: the column vector of total final demands

\mathbf{X}_1 represents all exogeneous sectors and \mathbf{X}_2 all endogenous sectors

Then we can write as:

$$(5A.6) \quad \mathbf{X}_1 = \mathbf{A}_{11}\mathbf{X}_1 + \mathbf{A}_{12}\mathbf{X}_2 + \mathbf{F}_1$$

$$(5A.7) \quad \mathbf{X}_2 = \mathbf{A}_{21}\mathbf{X}_1 + \mathbf{A}_{22}\mathbf{X}_2 + \mathbf{F}_2$$

From equation (5A.7) and substituting $\mathbf{X}_1 = \bar{\mathbf{X}}_1$ (exogenous) we have,

$$(5A.8) \quad (\mathbf{I} - \mathbf{A}_{22})\mathbf{X}_2 = \mathbf{A}_{21}\bar{\mathbf{X}}_1 + \mathbf{F}_2$$

Rearranging (5A.8),

$$(5A.9) \quad \mathbf{X}_2 = (\mathbf{I} - \mathbf{A}_{22})^{-1}(\mathbf{A}_{21}\bar{\mathbf{X}}_1 + \mathbf{F}_2)$$

Where, $(\mathbf{I} - \mathbf{A}_{22})^{-1}$: Leontif inverse matrix of endogenous sectors

Taking total differential of equation (5A.9),

$$(5A.10) \quad d\mathbf{X}_2 = (\mathbf{I} - \mathbf{A}_{22})^{-1}(\mathbf{A}_{21}d\bar{\mathbf{X}}_1 + d\mathbf{F}_2)$$

Using equation (5A.8) we have,

$$(5A.11) \quad d\mathbf{X} = \begin{pmatrix} d\mathbf{X}_1 \\ d\mathbf{X}_2 \end{pmatrix} = \begin{pmatrix} d\bar{\mathbf{X}}_1 \\ (\mathbf{I} - \mathbf{A}_{22})^{-1}(\mathbf{A}_{21}d\bar{\mathbf{X}}_1 + d\mathbf{F}_2) \end{pmatrix}$$

Therefore, the impact of these changes in GDP is given as:

$$(5A.12) \quad \Delta \text{GDP} = dV = \begin{pmatrix} V_1 d\bar{X}_1 \\ V_2 dX_2 \end{pmatrix}$$

Where, V is the diagonal matrix of value added ratio and

$$V_1 = \begin{pmatrix} V_{11} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & V_{1k} \end{pmatrix} \text{ and } V_2 = \begin{pmatrix} V_{21} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & V_{2m} \end{pmatrix}$$

This can also be written as, $V_1 = \text{diag}(V_{11}, \dots, V_{1k})$ and $V_2 = \text{diag}(V_{21}, \dots, V_{2m})$

In this model when agricultural output increases, agricultural input also increases with the increasing impact on output of other sectors. This will raise the output of the whole economy and increases the income level, which causes the final demand to upsurge. However, removing the technical inefficiencies of farmers, the agricultural output increases keeping the input level constant (using same level of inputs, output increases because of the enhancement in efficiency of farmers). This contradicts the above-mentioned model, which implies that both output, and input of agriculture increase. Therefore, the exogenous output model is expanded to know the impact of change in exogenous sectors on endogenous sectors based on two categories as: exogenous output model without income linkage and exogenous output model with income linkage as mentioned in Saito (1991).

Furthermore, using model without income linkage and with income linkage, the impact of change in agricultural productivity due to inter-industry linkage is measured in the former model and impact of change in agricultural productivity due to both effects: inter-industry linkage and income linkage in later model. The net effect is the difference between them and it is due to the income linkage effect. This net effect will overcome the contradiction mentioned above by normalization of relative effects and the effect of technical efficiency augmenting land reform can be evaluated.

A. Exogenous Output Model Without Income Linkage

$$(5A.13) \quad \bar{X}_1 = A_{11}\bar{X}_1 + A_{12}X_2 + F_1 + E_1 - M_1$$

$$(5A.14) \quad X_2 = A_{21}\bar{X}_1 + A_{22}X_2 + F_2 + E_2 - M_2$$

Endogenous variables: M_1, X_2

Exogenous variables: others ($X_1, F_1, F_2, E_1, E_2, M_2$)

Where, M_1, M_2 : imports and E_1, E_2 : exports.

We can express the comparative statics as follows:

$$(5A.15) \quad dX_2 = (I - A_{22})^{-1} (A_{21}dX_1 + dF_2 + dE_2 - dM_2)$$

$$(5A.16) \quad dM_1 = dF_1 + dE_1 + (A_{11} - I)dX_1 + A_{12}dX_2$$

B. Exogenous Output Model With Income Linkage

I. Final demand is determined by the income through consumption function expressed as:

$$(5A.17) \quad C = c_0 + c_1Y$$

Where, C= consumption, c_0 is autonomous consumption,
 c_1 = marginal propensity to consume and Y= income

$$(5A.18) \quad F = F_0 + F_1 = F_0 + c_1Y\tilde{F}_1 = \begin{pmatrix} F_{10} \\ F_{20} \end{pmatrix} + c_1Y \begin{pmatrix} \tilde{F}_{11} \\ \tilde{F}_{21} \end{pmatrix}$$

II. Income is generated from value added

$$(5A.19) \quad Y = A_v X = A_{v1}X_1 + A_{v2}X_2$$

Then the model with income linkage is expressed as follows:

$$(5A.20) \quad \bar{X}_1 = A_{11}\bar{X}_1 + A_{12}X_2 + F_{10} + F_{11} + E_1 - M_1$$

$$(5A.21) \quad X_2 = A_{21}\bar{X}_1 + A_{22}X_2 + F_{20} + F_{21} + E_2 - M_2$$

Where, $F_1 = c_1Y \cdot \tilde{F}_1$, where, \tilde{F}_1 the final demand (FD) share vector of exogenous part

$F_2 = c_1Y \cdot \tilde{F}_2$, where, \tilde{F}_2 the FD share vector of endogenous part

$$Y = A_{v1}\bar{X}_1 + A_{v2}X_2$$

Final demand function is given as follows:

$$(5A.22) \quad F_{11} = c_1\tilde{F}_1(A_{v1}\bar{X}_1 + A_{v2}X_2)$$

$$(5A.23) \quad F_{21} = c_1\tilde{F}_2(A_{v1}\bar{X}_1 + A_{v2}X_2)$$

By inserting these final demand functions into basic equilibrium equations (5A.20) and

(5A.21) we get the following:

$$(5A.24) \quad \bar{X}_1 = A_{11}\bar{X}_1 + A_{12}X_2 + F_{10} + c_1(A_{V1}\bar{X}_1 + A_{V2}X_2)\tilde{F}_1 + E_1 - M_1$$

$$(5A.25) \quad X_2 = A_{21}\bar{X}_1 + A_{22}X_2 + F_{20} + c_1(A_{V1}\bar{X}_1 + A_{V2}X_2)\tilde{F}_2 + E_2 - M_2$$

Expressing the comparative statistics, we have the follows equations:

$$(5A.26) \quad d\bar{X}_1 = A_{11}d\bar{X}_1 + A_{12}dX_2 + dF_{10} + c_1\tilde{F}_1(A_{V1}d\bar{X}_1 + A_{V2}dX_2) + dE_1 - dM_1$$

$$(5A.27) \quad dX_2 = A_{21}d\bar{X}_1 + A_{22}dX_2 + dF_{20} + c_1\tilde{F}_2(A_{V1}d\bar{X}_1 + A_{V2}dX_2) + dE_2 - dM_2$$

And the endogenous variables are expressed as follows:

$$(5A.28) \quad dX_2 = (I - A_{22} - c_1\tilde{F}_2A_{V2})^{-1}(A_{21} + c_1\tilde{F}_2A_{V1})d\bar{X}_1$$

$$(5A.29) \quad dM_1 = (A_{11} - I + c_1\tilde{F}_1A_{V1})d\bar{X}_1 + (A_{12} + c_1\tilde{F}_1A_{V2})dX_2$$

In Simulation 3, the impact on final demand is not linked but in Simulation 4, the impact of change in exogenous sectors on final demand is linked. In the next section, the results for four simulations are found and compared.

5A.5. Simulation Results

For the simulation with income linkage, marginal propensity to consume (mpc) is required for Nepalese economy. It is estimated by using historical time series data of Nepal which covers the data for 38 years from 1974/75 to 2011/12. For estimation of mpc, instrumental variable (IV) method is used by taking investment as instrument of gross domestic product. The estimated coefficient of mpc is 0.83 for Nepal¹.

Table 5A.5 shows the simulation results of the impact of distributive land reform. Land transferred from large land holdings to landless and marginal holdings will affect the GDP of each sector in the economy. In these simulations, the beyond limit land is transferred to landless and marginal households. This will have simultaneous effect on change in income and consumption. The results of transfer from large to landless and

¹ The estimated equation is: **Consumption** = 414.11 + 0.83 **GDP**
(t-value) (3.12) (324.44)

Number of observation = 38, F (1, 36) = 1298.79, Adjusted R-squared = 0.99

marginal households as the impact of land reform with and without income linkage are shown in table 5A.5.

Table 5A. 5: The Impact of Distributive Land Reform on Nepalese Economy

Sectors	Baseline GDP (million Rupees)	Without income linkage (S1)		With income linkage (S2)		Difference (S2-S1)
		Change	% Change	Change	% Change	% change
Paddy	96,776.64	800.90	0.83	2,127.38	2.20	1.37
Wheat	25,722.14	269.98	1.05	672.73	2.62	1.57
Other grains	41,534.84	393.89	0.95	1,010.44	2.43	1.48
Vegetables & fruits	108,335.96	1,084.89	1.00	2,796.09	2.58	1.58
Oilseed	9,601.66	66.56	0.69	208.26	2.17	1.48
Sugarcane	5,711.23	32.74	0.57	87.57	1.53	0.96
Jute & fibers	6,601.23	47.92	0.73	91.19	1.38	0.66
Other crops	97,336.95	916.06	0.94	2,454.76	2.52	1.58
Cattle	14,760.48	220.30	1.49	559.31	3.79	2.30
Other animal product	31,385.16	397.04	1.27	1,058.47	3.37	2.11
Raw milk	43,604.12	593.59	1.36	1,905.91	4.37	3.01
Wool	436.53	4.68	1.07	17.62	4.04	2.96
Forestry	15,506.57	94.49	0.61	239.39	1.54	0.93
Fishing	4,437.98	78.28	1.76	207.84	4.68	2.92
Mining & quarrying	6,164.52	2.99	0.05	29.04	0.47	0.42
Grain milling	9,639.72	185.35	1.92	593.40	6.16	4.23
Meat processing	1,719.01	19.71	1.15	61.29	3.57	2.42
Cooking oil	2,500.77	97.74	3.91	280.40	11.21	7.30
Dairy product	5,299.11	99.45	1.88	262.76	4.96	3.08
Other food product	5,571.14	310.68	5.58	644.32	11.57	5.99
Beverage-tobacco	3,485.90	257.12	7.38	468.10	13.43	6.05
Petroleum chemical	10,872.95	389.02	3.58	1,116.84	10.27	6.69
Metal	17,743.83	78.73	0.44	231.16	1.30	0.86
Vehicles & machinery	18,810.98	114.42	0.61	349.85	1.86	1.25
Textile & apparels	9,876.48	115.75	1.17	387.58	3.92	2.75
Other manufacturing	13,836.72	64.84	0.47	251.81	1.82	1.35
Public utility	22,695.59	72.29	0.32	260.04	1.15	0.83
Construction	96,245.99	50.72	0.05	279.85	0.29	0.24
Trading	192,605.33	845.73	0.44	2,414.96	1.25	0.81
Hotels and restaurants	25,664.48	135.19	0.53	692.79	2.70	2.17
Transportation	83,894.08	480.64	0.57	1,782.52	2.12	1.55
Communication	26,943.61	159.60	0.59	619.73	2.30	1.71
Financial intermediary	64,509.11	200.64	0.31	1,018.77	1.58	1.27
Real state & renting	116,174.03	935.35	0.81	1,903.81	1.64	0.83
Government services	126,787.99	270.56	0.21	964.29	0.76	0.55
Other services	12,160.17	106.53	0.88	496.69	4.08	3.21
Total	1,374,953.00	9,994.38	0.73	28,546.95	2.08	1.35

Source: Author's Calculation

As the transfer of income, the GDP of different sectors will increase. The rise in total GDP is 0.73% without income linkage and 2.08% with income linkage. This increase in GDP is directly associated with the benefit of landless and marginal rural households. This

will surge social welfare increasing equity in the society and decreasing inequality (see table 5A.6). The slight decrease in Gini coefficient shows that after land reform, the inequality falls.

The last column shows the difference between the two simulations (S2-S1) as net effect. In comparison to model without income linkage, in case of model with income linkage, the impact of transfer from large holdings to landless and marginal holdings gives rise of 1.35% of GDP. This is the net impact of income linkage in land transfers. Since land transaction is responsive to household income, the net impact is significantly large.

Table 5A. 6: Change in Inequality

Category	Gini Coefficient	Standard Error	Lower Bound	Upper Bound
Without income linkage				
Before Reform	0.31	0.07	0.18	0.46
After Reform	0.29	0.07	0.17	0.45
With income linkage				
Before Reform	0.31	0.07	0.18	0.46
After Reform	0.29	0.06	0.16	0.43

Source: Author's Estimation

Figure 5A.2 shows the comparison of impact of land transfers on GDP of the country without and with income linkage. The impact with income linkage is about three times higher than without income linkage. This is because transfer of land is induced by final demand. Transfer of land will increase the income and consumption demand of landless, marginal and poor rural households which will further increase the sectoral production. This will also bring the pro-poor growth in the economy.

The simulation results of technical efficiency augmenting land reform are presented in table 5A.7. In this table, Simulation 3 (S3) shows the impact of 10% increase in production of exogenous sectors without income linkage on the production of endogenous sectors and in the total GDP of the country. S3 further shows that impact of 10% increase in

exogenous sectors is seen in corresponding increase in cattle (3.08%), vehicle and machinery (2.20%), other food product (0.70%), transportation (0.52%), public utility (0.50%), other services (0.49%), grain milling (0.29) etc. This will increase the GDP in Nepalese economy by 3.03%.

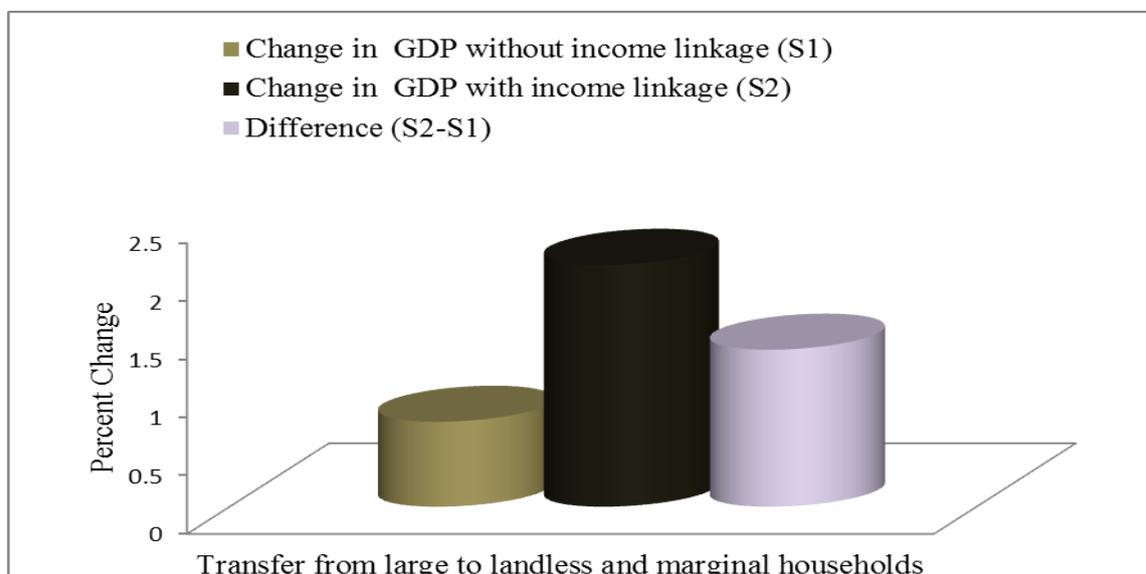


Figure 5A. 2: Impact of Distributive Land Reform on GDP

Similarly, the simulation results of exogenous output model with income linkage are presented as Simulation 4 (S4). The results show that impact of increase in exogenous sectors is seen in corresponding increase in cattle (10.68%), wool (932.81%), grain milling (13.60%), meat processing (22.08%), dairy products (34.11%), and other services (10.96%) etc. This will increase the GDP in Nepalese economy by 4.82%. The surprisingly strange impact is seen in the GDP of wool sector when linked to final demand. This is because; wool sector's final demand is about three times of its domestic production, which is coming from imports. The last column shows the difference between the two simulations (S4-S3) as net effect. In comparison to exogenous output model without income linkage, in case of model with income linkage, the impact of change in 10% of production in agricultural sectors gives rise of 1.79% of GDP. This is the net impact of technical efficiency augmenting land reform.

Table 5A. 7: The Impact of Increase in Agricultural Production on Nepalese Economy

Sectors	Baseline GDP (million Rupees)	Without income linkage (S3)		With income linkage (S4)		Difference (S4-S3) % change
		Change	% Change	Change	% Change	
Exogenous						
Paddy	96,776.64	9,677.66	10.00	9,677.66	10.00	0.00
Wheat	25,722.14	2,572.21	10.00	2,572.21	10.00	0.00
Other grains	41,534.84	4,153.48	10.00	4,153.48	10.00	0.00
Vegetables & fruits	108,335.96	10,833.60	10.00	10,833.60	10.00	0.00
Oilseed	9,601.66	960.17	10.00	960.17	10.00	0.00
Sugarcane	5,711.23	571.12	10.00	571.12	10.00	0.00
Jute & fibers	6,601.23	660.12	10.00	660.12	10.00	0.00
Other crops	97,336.95	9,733.70	10.00	9,733.70	10.00	0.00
Endogenous						
Cattle	14,760.48	454.68	3.08	1,576.66	10.68	7.6
Other animal product	31,385.16	0.62	0.00	1,435.70	4.57	4.57
Raw milk	43,604.12	0.12	0.00	1,738.10	3.99	3.99
Wool	436.53	0.05	0.01	4,072.04	932.81	932.8
Forestry	15,506.57	1.14	0.01	291.88	1.88	1.87
Fishing	4,437.98	0.00	0.00	95.32	2.15	2.15
Mining & quarrying	6,164.52	0.16	0.00	130.68	2.12	2.12
Grain milling	9,639.72	27.50	0.29	1,311.07	13.60	13.31
Meat processing	1,719.01	0.09	0.01	378.90	22.04	22.03
Cooking oil	2,500.77	0.01	0.00	211.37	8.45	8.45
Dairy product	5,299.11	0.16	0.00	1,807.49	34.11	34.11
Other food product	5,571.14	38.87	0.70	348.96	6.26	5.56
Beverage-tobacco	3,485.90	0.07	0.00	214.49	6.15	6.15
Petroleum chemical	10,872.95	6.77	0.06	641.78	5.90	5.84
Metal	17,743.83	17.67	0.10	156.57	0.88	0.78
Vehicles & machinery	18,810.98	413.25	2.20	630.69	3.35	1.15
Textile & apparels	9,876.48	1.21	0.01	115.93	1.17	1.16
Other manufacturing	13,836.72	2.64	0.02	358.71	2.59	2.57
Public utility	22,695.59	112.51	0.50	834.81	3.68	3.18
Construction	96,245.99	0.00	0.00	243.58	0.25	0.25
Trading	192,605.33	635.35	0.33	3,214.16	1.67	1.34
Hotels and restaurants	25,664.48	11.77	0.05	1,065.79	4.15	4.10
Transportation	83,894.08	438.19	0.52	2,645.13	3.15	2.63
Communication	26,943.61	2.83	0.01	305.20	1.13	1.12
Financial intermediary	64,509.11	184.61	0.29	1,102.71	1.71	1.42
Real state & renting	116,174.03	14.88	0.01	521.76	0.45	0.44
Government services	126,787.99	6.68	0.01	332.62	0.26	0.25
Other services	12,160.17	59.25	0.49	1,332.53	10.96	10.47
Total	1,374,953.00	41,593.13	3.03	66,276.68	4.82	1.79

Source: Author's Calculation

Figure 5A.3 shows the comparison of impact of change in productivity of agriculture on GDP of the country without and with income linkage. The impact with income linkage is about one third higher than without income linkage. This is because production is induced

by final demand. If demand is higher, the firms need to increase their production to meet the demand. This will increase the sectoral production based on their demand and expand the size of the economy.

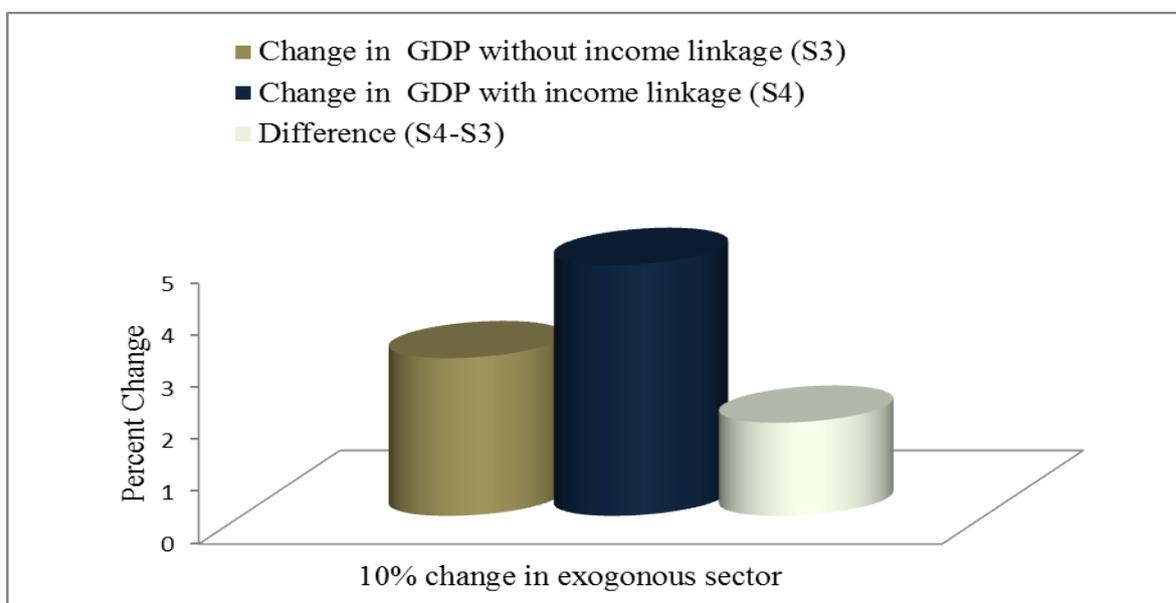


Figure 5A. 3: Impact of Change in Agricultural Production on GDP

These simulation results reveal that increase in production due to the technical efficiency enhancing land reform implementation has greater impact in Nepalese economy than distributive land reform. However, distributive land reform is more focused on making equitable society. Since agriculture has a larger share in Nepalese economy and basis for the living of poor people, it is necessary to develop the economy in equitable manner eliminating different barriers and transferring land rights to the most productive farmers by means of land reform implementation. For instance, we see from table 5A.5 and 5A.7 that both equity and efficiency aspects of land reform increase welfare in the economy. Equity approach of reform increases the GDP slightly but efficiency approach of reform upsurges GDP substantially. Therefore, successful implementation of land reform will both increase the size of the economy and reduce rural poverty, which will further accelerate the development of Nepal.

5A.6. Conclusion

A fresh input output table of Nepal for 2010/11 is estimated using secondary information from various sources. The output and value added multiplier analysis shows that agricultural sectors such as paddy, wheat and other grains are important sectors and can be considered as growth promoting sectors. Moreover, transfer of beyond ceiling land from landlords to landless and eliminating technical inefficiencies increases the production of agriculture up to 30%. Simulation shows that distributive land reform increases GDP by 0.73% without income linkage and by 2.08% with income linkage. Moreover, efficiency augmenting reform has greater impact on economy. 10% increase in agricultural production is associated with 3.03% increase in GDP without income linkage and it is 4.82% with income linkage. The impact of later is greater than former because the final demand of each sector induces its production with income linkage effect. The net impact of distributive reform in GDP is 1.35% while that of efficiency augmenting reform is 1.79%.

Moreover, it further reveals that land reform has enormous impacts, which help reduction of poverty in developing countries such as Nepal. Therefore, both types of land reform measures are necessary in Nepal. In addition, consolidation of fragmented land, cultivation of unused land, farmers access to irrigation facility, access to extension services, access to modern technology, farmers knowledge and training about farming skills are the factors, which could enhance the technical efficiency of farmers.

In this study, fresh input-output table is estimated and used to see the impact of land reform in Nepal. Since input-output framework does not have flow of income from goods and services, using social accounting matrix may give results that are more consistent. Therefore, estimation of social accounting matrix based on the input-output table used in this study and further finding the impact of land reform in Nepalese economy using SAM framework is the topic left for future research.

Table 5B.1: Continue (page 3)

Billion Rs	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	
Receipts | Payments	C-Dairy product	C-Other food product	C-Beverage-tobacco	C-Petroleum chemical	C-Metal	C-Vehicles & machinery	C-Textile and apparels	C-Other manufacturing	C-Public utility	C-Construction	C-Trading	C-Hotels and restaurants	C-Transportation	C-Communication	C-Financial Intermediary	C-Real state & renting	C-Government services	C-Other services	F-Labor	F-Capital	F-Land	Firm	Urban rich-KTM	Urban rich-Terai	Urban rich-Others	Urban medium-KTM	Urban medium-Terai	
1 A-Paddy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2 A-Wheat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3 A-Other grains	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4 A-Vegetables & fruits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5 A-Oilseed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6 A-Sugarcane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7 A-Jute and fibers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 A-Other crops	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9 A-Cattle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 A-Other animal product	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11 A-Raw milk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12 A-Wool	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13 A-Forestry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14 A-Fishing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15 A-Mining & quarrying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16 A-Grain milling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17 A-Meat processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18 A-Cooking oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19 A-Dairy product	9.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20 A-Other food product	0.00	12.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21 A-Beverage-tobacco	0.00	0.00	7.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22 A-Petroleum chemical	0.00	0.00	0.00	23.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23 A-Metal	0.00	0.00	0.00	0.00	39.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24 A-Vehicles & machinery	0.00	0.00	0.00	0.00	0.00	20.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25 A-Textile & apparels	0.00	0.00	0.00	0.00	0.00	0.00	27.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26 A-Other manufacturing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27 A-Public utility	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28 A-Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	259.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29 A-Trading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	207.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30 A-Hotels and restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31 A-Transportation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32 A-Communication	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33 A-Financial Intermediary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	77.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34 A-Real state & renting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	125.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35 A-Government services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	183.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36 A-Other services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
37 C-Paddy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.91	1.54	0.74	2.61	
38 C-Wheat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.22	0.07	1.52	
39 C-Other grains	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.18	0.02	0.46	
40 C-Vegetables & fruits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.98	3.56	0.51	7.72	
41 C-Oilseed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.16	0.42	0.16	0.36	
42 C-Sugarcane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.20	0.86	0.12	0.04	
43 C-Jute & fibers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.11	0.13	0.07	0.26	
44 C-Other crops	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.53	3.66	0.26	9.48	
45 C-Cattle																												

Table 5B.1: Continue (page 4)

Billion Rs	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107
Receipts \ Payments	Urban medium-Others	Urban poor-KTM	Urban poor-Terai	Urban poor-Others	Rural landless-KTM	Rural landless-Terai	Rural landless-Others	Rural marginal-KTM	Rural marginal-Terai	Rural marginal - Others	Rural small-KTM	Rural small-Terai	Rural small-Others	Rural medium-KTM	Rural medium-Terai	Rural medium-Others	Rural large-KTM	Rural large- Terai	Rural large- Others	Income tax	VAT	Import duty	Government	Capital	Rest of the World	Total Use
1 A-Paddy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	113.74
2 A-Wheat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.58
3 A-Other grains	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.66
4 A-Vegetables & fruits	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	143.72
5 A-Oilseed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.78
6 A-Sugarcane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.04
7 A-Jute and fibers	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.29
8 A-Other crops	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	122.84
9 A-Cattle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.66
10 A-Other animal product	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.81
11 A-Raw milk	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	103.31
12 A-Wool	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.36
13 A-Forestry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.38
14 A-Fishing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.27
15 A-Mining & quarrying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.46
16 A-Grain milling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.40
17 A-Meat processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.50
18 A-Cooking oil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.67
19 A-Dairy product	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.64
20 A-Other food product	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.89
21 A-Beverage-tobacco	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.99
22 A-Petroleum chemical	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.59
23 A-Metal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.52
24 A-Vehicles & machinery	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.97
25 A-Textile & apparels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.77
26 A-Other manufacturing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.85
27 A-Public utility	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.06
28 A-Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	259.17
29 A-Trading	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	207.02
30 A-Hotels and restaurants	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.39
31 A-Transportation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.79
32 A-Communication	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.67
33 A-Financial Intermediary	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	77.82
34 A-Real state & renting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	125.88
35 A-Government services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	183.24
36 A-Other services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.30
37 C-Paddy	2.02	0.26	1.18	0.32	0.05	1.40	1.44	0.22	6.11	2.57	1.12	7.53	11.32	0.22	1.39	1.45	0.07	0.82	0.91	0.00	0.00	0.00	0.00	4.52	0.03	113.74
38 C-Wheat	0.69	0.06	0.39	0.10	0.00	1.55	0.14	0.01	2.62	0.87	0.09	6.38	7.97	0.04	0.71	0.81	0.01	0.36	0.14	0.00	0.00	0.00	0.00	1.23	0.53	31.58
39 C-Other grains	4.99	0.02	0.08	0.08	0.01	1.34	0.36	0.02	3.34	2.48	0.21	6.88	13.15	0.11	0.17	1.47	0.00	0.05	0.15	0.00	0.00	0.00	0.00	2.48	0.48	50.95
40 C-Vegetables & fruits	11.19	0.15	0.61	0.25	0.05	7.61	0.76	0.13	13.45	2.97	0.83	23.30	27.79	0.28	3.25	7.23	0.07	2.72	1.26	0.00	0.00	0.00	0.00	4.09	1.96	147.65
41 C-Oilseed	0.19	0.02	0.09	0.09	0.02	0.09	0.01	0.02	0.27	0.17	0.16	0.06	0.26	0.05	0.12	0.10	0.03	0.23	0.08	0.00	0.00	0.00	0.00	0.26	0.96	13.78
42 C-Sugarcane	0.35	0.02	0.11	0.04	0.01	0.16	0.18	0.02	0.33	0.46	0.19	0.21	0.13	0.05	0.44	0.67	0.01	0.26	0.25	0.00	0.00	0.00	0.00	0.09	0.01	8.04
43 C-Jute & fibers	0.20	0.01	0.06	0.02	0.00	0.44	0.12	0.05	0.13	0.21	0.19	0.35	0.04	0.08	0.14	0.07	0.01	0.11	0.25	0.00	0.00	0.00	0.00	0.02	0.26	8.29
44 C-Other crops	9.40	0.11	0.42	0.17	0.03	4.00	0.56	0.09	10.61	4.30	1.66	19.41	22.92	0.25	2.51	7.18	0.04	1.24	0.99	0.00	0.00	0.00	0.00	1.47	1.17	122.84
45 C-Cattle	1.79	0.05	0.22	0.16	0.01	0.84	0.64	0.12	1.69	1.22	0.66	2.88	2.46	0.14	1.29	1.16	0.03	0.58	0.78	0.00	0.00	0.00	0.00	1.16	0.25	34.66
46 C-Other animal product	2.23	0.05	0.19	0.08	0.01	1.30	0.28	0.05	2.37	1.18	0.36	3.15	9.37	0.09	0.40	1.99	0.02	0.25	0.37	0.00	0.00	0.00	0.00	0.15	0.54	60.81
47 C-Raw milk	10.45	0.04	0.19	0.05	0.04	2.82	0.33	0.04	7.18	2.80	0.31	17.41	24.96	0.18	1.76	6.01	0.02	0.47	0.46	0.00	0.00					

6. Conclusions, Policy Implications and Future Suggestions

6.1 Conclusions

Nepal has more than six decades experience of land reform. However, the implementation of land reform policies was identified as the weak part of Nepalese land reform. Therefore, in this research, the impact of implementation of land reform policy on equity, efficiency and macro-economy of Nepal is evaluated from micro as well as macro perspectives.

The research presented here is original. The originality can be viewed in the methods it has implemented to come to the conclusion. In this research, micro as well as macro perspectives are used and linked together. From micro perspectives, latest Nepal living standard survey 2010/11 data are used to estimate household welfare function for distributive reform and Cobb-Douglas production frontier function and data envelopment analysis for productivity augmenting reform. Moreover, as the part of this research work, input-output (IO) table and social accounting matrix (SAM) of Nepal for 2010/11 are also estimated. Since there is no authentic IO table and SAM for Nepal published by government agency, estimation of fresh IO table and SAM has great importance. Then, using the results of micro studies of chapter three and chapter four, the economy-wide impacts of land reform using IO and SAM framework are calculated. Furthermore, in chapter five and in appendix 5A, the micro-simulation impacts of land reform on macro-economy of Nepal are analyzed using both SAM (in chapter five) and IO framework (in appendix 5A). Review of relevant literature reveals that this type of study is novel in literature as well as in case of Nepal and has great significance for policy.

The main motivation of this research is to evaluate the impact of implementation of current land reform policies in Nepal using micro-simulation macro-effect approach. To

address this motivation, three research questions are set in chapter one as- Does land reform increase household equity and welfare in Nepal? How land reform implementation can reduce inefficiency in Nepalese agriculture? What is the impact of land reform in Nepalese macro economy? Then, the answer of these three research questions are explored in three core chapters of this study. Chapter three explores the answer to the first research question, chapter four explores the answer to the second research question and chapter five and appendix 5A explore the answer to third research question. Additionally, chapter one and two give background, theories, experiences and literatures to support the core chapters.

To answer the first research question, micro level latest household survey data from Nepal is used to estimate household welfare functions in chapter three by taking household own land size as main policy variable. Furthermore, using the estimated welfare function equations of both types (income and consumption); the current land ceiling policy of Government of Nepal is simulated to see the impact of distributive land reform on per capita household income and consumption. Similarly, poverty and inequality indices are calculated.

The findings of this analysis suggest that implementation of current ceiling policy will increase average per capita household income by 3.85% and average per capita household consumption by 3.13%. Moreover, there will be substantial increase in per capita household income and consumption in landless and marginal households but only slightly decrease in per capita household income and consumption in large households while small and medium households are unaffected by these ceiling policies. Similarly, the overall poverty and inequality will be reduced slightly (about three percentage point) while rural poverty will be decreased substantially but no change in urban poverty. Hence, this analysis successfully answers the first research question that implementation of land reform policy will increase equity and welfare in Nepal.

To answer the second research question using the same household survey, Cobb-Douglas stochastic production function (SPF), data envelopment analysis (DEA) and inefficiency effects model are used in chapter four to estimate the technical efficiency scores and sources of inefficiency in Nepalese agriculture.

The findings of this analysis suggest that Nepalese household farms are operating less than frontier and inefficiency sources are common. The gap between frontier and actual production is 30 percent based on SPF and 32 percent based on DEA showing mean technical efficiency scores vary widely between household land sizes and regions. Estimated results show an overall mean technical efficiency score of 0.70 by SPF methods and 0.68 by DEA methods. Based on these results, sample households could increase about 30 to 32 percent of their output through better use of available resources. Additionally, estimated results reveal that the unused land and very large or very small size of household land is an important source of technical inefficiency.

Lack of implementation of reforms, keeps the most productive land unused, underused or less productive otherwise it would be. In addition, absentee landlordism, fragmentation of productive land in many parcels, lack of farmers' education and experience, lack of extension services, lack of use of modern equipment and technology, are the barriers in Nepalese agriculture. Similarly, making small-medium sized productive farms by means of redistribution of beyond ceiling land and the consolidation of fragmented lands enhances efficiency in Nepalese agriculture. If identified inefficiency effects were eliminated, we could increase the output keeping the same level of inputs. This can be done only by properly implementing productivity enhancing land reform. Hence, this analysis also successfully answers the second research question that implementation of land reform policy can reduce inefficiency in Nepalese agriculture.

To answer the third research question, IO table and SAM of Nepal for 2010/11 are estimated. Then, using the results of micro studies from chapter three and chapter four, the economy-wide impacts of land reform using IO and SAM framework are calculated. In chapter five, three simulations are performed. The first simulation is the impact of redistributive reform in Nepalese economy (using results from chapter three), the second simulation is the impact of production augmenting reform (using result from chapter four) and the third simulation is the impact of both reforms simultaneously.

The findings of chapter five suggest that land reform has positive economy-wide impacts. Distributive land reform increases income level of rural landless and marginal households and reduces inequality. Moreover, there will be substantial increase in income of rural landless and marginal households and slightly decrease in income of rural large households in all regions as the same percentage in chapter three because consumption results from chapter three are used taking these households as exogenous. However, different from chapter three, the income of small and medium households will also increase in this analysis increasing the total production and income in the economy. This is because, in SAM framework, the change in policy in micro level has an economy-wide macro effect, which is the main theme of micro-simulation macro-effects approach. Similar to chapter three, implementation of redistributive reform will increase equity in the whole economy. Additionally, the IO analysis presented in appendix 5A has also similar but little less impact than SAM because SAM framework also captures the circular flow of income in an economy, which IO framework does not.

However, productivity augmenting reform has more impacts on economy. In this setting, 10% increase in agricultural crop production will increase the production of all sectors of economy including income of all households as the result of multiplier effect in the economy. In the same time, it will keep the inequality level unchanged because this will

affect the income of all households in the similar manner. Similar to chapter four, productivity augmenting reform has economy-wide effects (IO analysis has similar but less impacts in this case too).

Furthermore, implementing both types of reforms simultaneously produces huge impact on Nepalese economy by gaining both equity and efficiency together. Therefore, both types of reforms are important for Nepal. The former increase equity while the later increases efficiency. Both reform measures using together will not only increases welfare of households and productivity of economy but also increases the possibility of investment in rural infrastructure, commercialization of agriculture and shifting the surplus labor force in the modern sector by opening the doors for transformation of Nepalese economy. Hence, this analysis also successfully answers the third research question that implementation of land reform policy has substantial positive impacts in Nepalese macro economy.

6.2 Policy Implications

In order to implement the redistributive land reform, proper identification of rural landless people before redistribution starts is the most. Who are the exact possible beneficiaries of the redistributive reform policy? To know the identity of real landless, the local level communities in their origin can help them to identify properly. Therefore, before starting the implementation process, the concerned authorities are recommended to make good records and database of beneficiary landless using information from local levels. These will help in the screening of false landless, landless acclaimed by some political parties with their political interest and so on and prevent from adverse selection due to information asymmetry.

Furthermore, this research has another recommendation that land reform should be one shot policy action all over the country and successful implementation is crucial. Besides,

both redistributive and production augmenting land reform should be implemented together. To control fragmentation of land, transfer of land from father to sons or daughters in inheritance basis should not be free of taxes but with substantial tax to the government. This will help to control the fragmentation of land and make the new generation less dependent on their parents bequeath without their any effort. This will not only raise the revenue of the government but also divert the pattern of investing money to buy land for offspring to invest in other productive sectors.

Together with land reform policies and action plan, the country should also implement land use policy, which is already prepared but not implemented yet. Land consolidation, provision of transfer of land in inheritance basis, separation of agricultural land and residential land, etc. are the main features of land use policy, which are also similar to land reform policies.

6.3 Suggestions for Future Research

In the course of doing this research, the followings issues are identified, which will be the good subjects for extension of this research work.

In this research, due to the unavailability of household level panel data, the cross section data of Nepal living standard survey 2010/11 is used. In Nepal, three panel studies were already conducted in household level in 1995/96, 2003/04 and 2010/11. If these data were available, it would be better to use panel analysis for chapters three, four and five.

An agricultural household acts as both producer and consumer of agricultural products. Using household level data, we can study consumption and production behaviors of Nepalese households. Therefore, the estimation of household demand function and household production function for each category of household may be a topic for further research.

In this research, two general equilibrium model-SAM in chapter five and IO model in appendix 5A are used. SAM based general equilibrium model gives more precise impact assessment of policy alternatives in an economy than input-output model. However, in SAM model price is assumed constant and exogenous. This type of fixed price model does not capture the substitution effects. In addition, in SAM model, some sectors must be kept exogenous. This has disadvantage of over calculation of change in income, output and other variables. In contrary, computable general equilibrium (CGE) model assumes price as endogenous and captures the substitution effects. Moreover, in CGE model, all sectors are assumed endogenous; labor market is cleared and may give micro-economy consistent effects of policy. In SAM model, the results from chapters four and five are used, which may be good at this point. Using CGE, the consistency of this research may be violated because SAM and CGE models may give different results due to different assumptions used. However, to overcome the bottlenecks that arise in SAM framework, it is suggested to use CGE modeling framework to study the impact of alternative policy scenarios of land reform in Nepal, which is also the topic for our further research.

In this dissertation, the static analytical approach is used. The change in social structure, change in income dynamics, change in allocation of factors of production, change in the structures of land and labor markets are not considered. Therefore, the dynamic analysis of the impact of land reform can be an issue for future research.

Additionally, land reform is an important political agenda in developing countries. Most of the political parties in Nepal have included land reform in their programs. In this research, the economic aspect is more focused than political one. Therefore, focusing more on political aspect or both aspects, political economy of land reform in Nepal can also be a good topic for future research.

References

- Acharya, S. (2010). Potential Impacts of the Devaluation of Nepalese Currency: A General Equilibrium Analysis. *Economic Systems* 34(4), 413-436.
- Adhikari, C. B. & Bjorndal T. (2009). Can Land Reform be an Effective Approach to Alleviate Poverty in Nepal? *Working Paper no 30/09*. Bergen: Institution for Research in Economics and Business Administration.
- - - . (2012). Analyses of Technical Efficiency Using SDF and DEA Models: Evidence from Nepalese Agriculture. *Applied Economics*, 44(25), 3297–3308. doi:10.1080/00036846.2011.572856
- Adhikari, J. (2008). *Land Reform in Nepal Problems and Prospects*. Kathmandu: Action Aid Nepal.
- Aigner, D., Lovell, C. A. K. & Schmidt, P. (1977). Formulation and Estimation of Stochastic Frontier Production Function Model. *Journal of Econometrics*, 6(1), 21-37.
- Aliber, M., & Cousins, B. (2013). Livelihoods after Land Reform in South Africa. *Journal of Agrarian Change*, 13(1), 140–165. doi:10.1111/joac.12012
- Badal Commission (2000). *Report of High Level Commission (Badal) on Land Reform 1996*. Kathmandu: P.B. Prakashan.
- Ban, S. H., Moon, P. Y. & Perkins D. (1980). *Rural Development: Studies in the Modernization of the Republic of Korea, 1945-1975*. Cambridge, MA: Harvard University Press.
- Banerjee, A. V. (1999). Land Reforms: Prospects and Strategies. *Working Paper-Massachusetts Institute of Technology Department of Economics*, (24).
- Banerjee, A. V., Gertler, P. J. & Ghatak, M. (2002). Empowerment and Efficiency: Tenancy

- Reform in West Bengal. *Journal of Political Economy*, 110(2), 239–280.
doi:10.1086/338744
- Banker, R. D., Charnes, A. & Cooper, W. W. (1984). *Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis*. Ft. Belvoir: Defense Technical Information Center.
- Bardhan, P. & Mookherjee, D. (2010). Determinants of Redistributive Politics: An Empirical Analysis of Land Reforms in West Bengal, India. *The American Economic Review*, 1572–1600.
- Bardhan, P. (1973). Size, Productivity, and Returns to Scale: An Analysis of Farm-Level Data in Indian Agriculture. *Journal of Political Economy*, 81(6), 1370-1386.
- - - . (1996). Efficiency, Equity and Poverty Alleviation: Policy Issues in Less Developed Countries. *The Economic Journal*, 106(438), 1344–1356.
- Bellisario, A. (2007). The Chilean Agrarian Transformation: Agrarian Reform and Capitalist “Partial” Counter-Agrarian Reform, 1964–1980. *Journal of Agrarian Change*, 7(1), 1–34. doi:10.1111/j.1471-0366.2007.00138.x
- Besley, T., & Burgess, R. (2000). Land Reform, Poverty Reduction, and Growth: Evidence from India. *Quarterly Journal of Economics*, 115(461), 389-430.
- Bhalla, S. S., & Roy, P. (1988). Mis-specification in Farm Productivity Analysis: The Role of Land Quality. *Oxford Economic Papers*, 40(1), 55-73.
- Bhandari R. & Linghorn A. (2011). The Four Pillars of Successful Land Reform: Can Revolutionary Nepal Stand Up? *Himalayan Journal of Development and Democracy*, 6(2), 1-20.
- Bhattarai, K. (2007). *Models of Economic and Political Growth in Nepal*. New Delhi: Serials Publications.

- Binswanger, H. P., Deininger, K. & Feder, G. (1995). Power, Distortions, Revolt, and Reform in Agricultural Land Relations. In: J. Behrman & T. N. Srinivasan, (Eds.), *Hand Book of Development Economics*, 3, 2659-2772.
- Borras, S.M., Kay, C. & Akram-Lodhi, A. H. (2007). Agrarian Reform and Rural Development: Historical Overview and Current Issues. In: Akram-Lodhi, A.H., Borras S. M. & Kay, C. (Eds.), *Land, Poverty and Livelihoods in an Era of Globalization: Perspectives from Developing and Transition Countries*. London and New York: Routledge.
- Borras, S. M. (2003). Questioning Market-Led Agrarian Reform: Experiences from Brazil, Colombia and South Africa. *Journal of Agrarian Change*, 3 (3), 367–394.
- Bravo-Ureta, B., Solis, D., Moreira, L. V., Maripani, J., Thiam, A., & Rivas, T. (2007). Technical Efficiency in Farming: A Meta-Regression Analysis. *Journal of Productivity Analysis*, 27 (1), 57-72.
- Carter, M. R. (1984). Identification of Inverse Relationship between Farm Size and Productivity: An Empirical Evidence of Peasant Agricultural Production. *Oxford Economic Papers*, 36(1), 131-145.
- Carter, M. R. (2003). Designing Land and Property Rights Reform for Poverty Alleviation and Food Security. *Land Reform, Land Settlement and Cooperatives*. Rome: FAO.
- Central Bureau of Statistics (1996). *Nepal Living Standard Survey 1995/96 Dataset*. Kathmandu: Central Bureau of Statistics.
- - - . (2006). *Monograph Agriculture Census of Nepal 2001/02*. Kathmandu: Central Bureau of Statistics.
- - - . (2008). *Nepal Labor Force Survey*. Kathmandu: Central Bureau of Statistics.
- - - . (2011a). *Nepal Living Standard Survey 2010/11 Dataset*. Kathmandu: Central Bureau of Statistics.

- - - . (2011b). *Poverty in Nepal*. Kathmandu: Central Bureau of Statistics.
- - - . (2012). *National Population and Housing Census 2011 National Report*. Kathmandu: Central Bureau of Statistics.
- - - . (2013a). Government of Nepal, National Planning Commission Secretariat, Central Bureau of Statistics website. <http://www.cbs.gov.np/index.php>, accessed on 2013 May 17.
- - - . (2013b). *System of National Accounts*. Kathmandu: Central Bureau of Statistics.
- Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. *European Journal of Operational Research*, 2(6), 429-444.
- Coelli, T. J, Rao. D.S P., O'Donnell, C.J. & Battese, G.E. (2005). *An Introduction to Efficiency and Productivity Analysis*. New York: Springer Publication.
- Community Self Reliance Centre (2009). *Land and Land Tenure Security in Nepal- A Country Study Report*. Kathmandu: Community Self Reliance Center.
- Dagistan, E. (2010). Determination of Technical Efficiency in Wheat (*Triticum Aestivum* L.) Production of Turkey: A Case Study of Cukurova Region. *Journal of Food, Agriculture and Environment*, 8(2), 354-358.
- de Janvry, A. (1981). The Role of Land Reform in Economic Development: Policies and Politics. *American Journal of Agricultural Economics*, 63(2), 384-392.
- de Janvry, A., Cordillo, G., Platteau J. & Sadoulet, E. (2001). *Access to Land, Rural Poverty, and Public Action*. London: Oxford University Press.
- Deininger, K. W. (2003). *Land Policies for Growth and Poverty Reduction*. Washington D.C.: World Bank.
- Deininger, K., Jin, S. & Nagarajan, H. K. (2009). Land Reforms, Poverty Reduction, and Economic Growth: Evidence from India. *Journal of Development Studies*, 45(4), 496–521. doi:10.1080/00220380902725670

- Do, Q. T. & Iyer, L. (2003). *Land Rights and Economic Development: Evidence from Vietnam*. Washington D.C.: World Bank, Development Research Group, Poverty Team.
- Dorner, P. (1972). *Land Reform and Economic Development*. Harmondsworth, Eng.: Penguin Books.
- - - . (1992). *Latin American Land Reforms in Theory and Practice: A Retrospective Analysis*. Madison Wisconsin: The University of Wisconsin Press.
- Eakin, H., Bausch, J. C., & Sweeney, S. (2013). Agrarian Winners of Neoliberal Reform: The “Maize Boom” of Sinaloa, Mexico. *Journal of Agrarian Change*, 14(1), 26-51. doi:10.1111/joac.12005
- Eastwood, R., Lipton, M., & Newell, A. (2010). Farm Size. *Handbooks in Economics*, 18(4), 3323-3400.
- Fei, J. C. H., Ranis, G., & Kuo, S. W. Y. (1979). *Growth with Equity: The Taiwan Case*. New York: World Bank & Oxford University Press.
- Government of Nepal (2007). *Interim Constitution of Nepal 2007*. Kathmandu: Government of Nepal.
- Griffin, K., Khan, A. R., & Ickowitz, A. (2002). Poverty and the Distribution of Land. *Journal of Agrarian Change*, 2(3), 279–330.
- GTAP (2012). *GTAP 8 Database*. Purdue University
- Hasan, M. K., & Islam, S. M. F. (2010). Technical Inefficiency of Wheat Production in Some Selected Areas of Bangladesh. *Bangladesh Journal of Agricultural Research*. 35(1), 101-112.
- Heltberg R. (1998). Rural Market Imperfections and the Farm Size-Productivity Relationship: Evidence from Pakistan. *World Development*, 26(10), 1807-1826.

- Hertzler, D. (2007). *Bolivia's Agrarian Revolution: Trying to Keep the Promises of Past Governments*. Andean Information Network. Retrieved July 20, 2013, from <http://www.wola.org/bolivia/AIN Land Reform 08.07.pdf>.
- Hoogeveen, J. G. M., & Kinsey, B. H. (2001). Land Reform, Growth and Equity: Emerging Evidence from Zimbabwe's Resettlement Programme - A Sequel. *Journal of Southern African Studies*, 27(1), 127–136. doi:10.1080/03057070120029536
- Kalirajan, K. (1991). The Importance of Efficient Use in the Adoption of Technology: A Micro Panel Data Analysis. *Journal of Productivity Analysis*, 2(2), 113–26.
- Karki, A. K. (2002). Movements from Below: Land Rights Movement in Nepal. *Inter-Asia Cultural Studies*, 3(2), 201-207.
- Kaur M., Mahal A. K., Sekhon, M. K. & Kingra, H. S. (2010). Technical Efficiency of Wheat Production in Punjab: A Regional Analysis. *Agricultural Economics Research Review* 23, 173-179.
- Kawagoe, T. (1999). Agricultural Land Reform in Postwar Japan: Experiences and Issues. *World Bank Policy Research Working Paper*, 2111, 1–43.
- Kay, C. (2002). Why East Asia Overtook Latin America: Agrarian Reform, Industrialization and Development. *Third World Quarterly* 23 (6), 1073–1102.
- King, R. (1977). *Land Reform: A World Survey*. Boulder, Colo: Westview Press.
- Kobayashi S., Tanji H., Saito K., Huang W., & Tada M. (2009) Industrial Structural of Cambodia and the Role of Agriculture and Fishery in its Development. *Japanese Agricultural Research Quarterly*, 43(4), 309-316.
- Kurkalova, L. A., & Jenson H. H. (2000). *Technical Efficiency of Grain Production in Ukraine*. Ames, IA: Center for Agricultural and Rural Development, Iowa State University.
- Ladejinsky, W. (1960). Land Reform in Japan. *The Journal of Modern History*, 32(1).

- Latruffe, L., Balcombe, K., Davidova, S., & Zawalinska, K. (2004). Determinants of Technical Efficiency of Crop and Livestock Farms in Poland. *Applied Economics*, 36(12), 1255-1263.
- Leach, A. (1998). Land Reform and Socioeconomic Change in Kenya. *East African Journal of Peace & Human Rights*, 4(1), 41-69.
- Leontief, W. W. (1966). *Input-Output Economics*, New York: Oxford University Press
- Lipton, M. (2010). *Land Reform in Developing Countries: Property Rights and Property Wrongs*. London: Rutledge.
- Lumsalee, R. R. (2002). *Land Issues in Nepal*. Paper Presented at the Regional Workshop on Land Issues in Asia, Phnom Penh, Cambodia.
- Meeusen, W., & Van, D. B. J. (1977). Efficiency Estimation from Cobb-Douglas Production Functions with Composed Error. *International Economic Review*, 18(2), 435-444.
- Ministry of Agriculture and Development (2012). *Agricultural Statistics of Nepal*. Kathmandu: Ministry of Agriculture and Development.
- Ministry of Commerce and Supply (2013). *Nepal Overseas Trade Statistics 2011/2012*. Kathmandu: Trade and Export Promotion Center.
- Ministry of Finance (2012). *Economic survey*. Kathmandu: Ministry of Finance.
- (2013). *Economic survey*. Kathmandu: Ministry of Finance.
- Ministry of Land Reform and Management (2012). *Historical Background*. Retrieved December 24, 2012, from <http://www.molrm.gov.np/content.php?id=162>.
- Nepal Law Commission (2012). *Lands Related Act 1964*. Kathmandu: Government of Nepal.
- Neupane, K. (2011). A Half Century of Land Reform: Nepal's Experience. *International Property Right Index 2011 Report*. Retrieved March 12, 2012,

from http://propertyrightsalliance.org/userfiles/file/ATR_2011%20INDEX_Web2.pdf.

- Nguyen, D. T., & Saldivar, M. M. (1979). The Effects of Land Reform on Agricultural Production, Employment and Income Distribution: A Statistical Study of Mexican States, 1959-69. *The Economic Journal*, 89(355), 624–635.
- Odec, J. (2007). Measuring Technical Efficiency and Productivity Growth: A Comparison of SFA and DEA on Norwegian Grain Production Data. *Applied Economics*, 39(20), 2617-2630.
- Parra, J. C. and Wodon Q. (2009). SimSIP SAM: A Tool for the Analysis of Input-Output Tables and Social Accounting Matrices. *Mimeo*. Washington DC: the World Bank.
- Paudel, D. B. (2011). Impact of Social Networks on Labor Migration Decision in Nepal. *The Japanese Journal of Rural Economics, Special Issue 2011*, 345-351.
- Ping Li, J.D. (2003). Rural Land Tenure Reforms in China: Issues, Regulations and Prospects for Additional Reform. *Land Reform 2003/3*. Rome: FAO.
- Quizon, A. B. (2005). *Asian NGO Perspectives on Agrarian Reform & Access to Land*. Quezon City: Asian NGO Coalition for Agrarian Reform and Rural Development.
- Raihan S. & Khondker B. H. (2011). A Social Accounting Matrix for Nepal for 2007: Methodology and Results. *MPRA Working Paper*. Retrieved April 13, 2013, from <http://mpa.ub.uni-muenchen.de/37903/>.
- Rashid, S. (2000). *Is Land Reform Viable under Democratic Capitalism?* Urbana Champaign: University of Illinois.
- Ray, D. (1998). *Development Economics*. Princeton: Princeton University Press.
- Regmi, M. (1977). *Land ownership in Nepal*. Delhi: Adroit publishers.
- Reyes, R. (2005). Land, Poverty and State-Society Interaction in the Philippines. In: Akram-Lodhi, H., S. Borras & C. Kay (Eds.). *Land, Poverty and Livelihoods in the Era of*

- Globalization: Perspectives from Developing and Transition Countries*. London and New York: Routledge.
- Ricardo, D. (1996). *Principles of Political Economy and Taxation*. New York: Prometheus Books.
- Rozelle, S., & Swinnen, J. F. (2004). Success and Failure of Reform: Insights from the Transition of Agriculture. *Journal of Economic Literature*, 42(2), 404–456.
- Sadoulet, E. and de Janvry A. (1995). *Quantitative Development Policy Analysis*. Maryland: John Hopkins University Press.
- Saito, K. (1991). An Impact Evaluation of Rice Trade Liberalization on Regional Economy. In: Morishima, M. (Ed.), *Impact Projection of Rice Import Liberalization in Japan* (in Japanese). Tokyo: Fumin Kyokai.
- Sapkota P.R. & Sharma R. K. (1998). *A Computable General Equilibrium Model of the Nepalese Economy*. Working paper, Micro Impact of Macroeconomic and Adjustment Policies (MIMAP), Third annual Meeting, Kathmandu. Retrieved August 24, 2012, from <http://web.idrc.ca/uploads/user-S/10282122230mimap56.pdf>.
- Sapkota, C. (2013). Remittances in Nepal: Boon or Bane? *The Journal of Development Studies*, Published online: 12 Aug 2013.
- Sen, A. K. (1962). An Aspect of Indian Agriculture. *Economic Weekly*, Annual Number 14.
- - - . (1966). Peasants and Dualism with or without Surplus Labor. *Journal of Political Economy*, 74(5), 425-450.
- Shafiq, M., & Rehman, T. (2000). The Extent of Resource Use Inefficiencies in Cotton Production in Pakistan's Punjab: An Application of Data Envelopment Analysis. *Agricultural Economics*, 22(3), 321–330.

- Sharma, K. R., Leung, P. S., & Zaleski, H. M. (1999). Technical, Allocative and Economic Efficiencies in Swine Production in Hawaii: a Comparison of Parametric and Nonparametric Approaches. *Agricultural Economics*, 20(1), 23-35.
- Shrestha, N. R. (1990). *Landlessness and Migration in Nepal*. Boulder: Westview Press.
- Sobhan, R. (1993). *Agrarian Reform and Social Transformation: Preconditions for Development*. London: Zed Books.
- Squires, D. & Taber, S. (1991). Technical Efficiency and Future Production Gains in Indonesian Agriculture, *Journal of Development Economics*, 29, 258–270.
- Taylor, T. G., & Shonkwiler, J. S. (1986). Alternative Stochastic Specifications of the Frontier Production Function in the Analysis of Agricultural Credit Programs and Technical Efficiency. *Journal of Development Economics*, 21(1), 149–160.
- Thapa, S. (2007). The Relationship between Farm Size and Productivity: Empirical Evidence from the Nepalese Mid-Hills. *MPRA Paper No. 7638*. Retrieved June 29, 2012, from <http://mpra.ub.uni-muenchen.de/7638/>.
- Thwin N. K. S, Yoshida T. & Maeda K. (2010). Industrial Structure in Myanmar Using a New Estimated Input-Output Table (2000-2001). *Journal Faculty of Agriculture, Kyushu University*, 55(2), 387-396.
- Tian, W. & Wan, G. H. (2000). Technical Efficiency and Its Determinants in China's Grain Production. *Journal of Productivity Analysis*, 13(2), 159-174.
- Tipi, T., & Rehber, E. (2006). Measuring Technical Efficiency and Total Factor Productivity in Agriculture: The Case of the South Marmara Region of Turkey. *New Zealand Journal of Agricultural Research*, 49(2), 137-145.
- Upreti, B. R., Sharma, S. R. & Basnet, J. (2009). *Land Politics and Conflict in Nepal: Realities and Potentials for Agrarian Transformation*. Kathmandu: Community Self Reliance Centre.

- Van, Zyl J., Binswanger, H. P. & Thirtle, C. G. (1995). *The Relationship between Farm Size and Efficiency in South African Agriculture*. Washington, D.C: The World Bank.
- Wily, L., Chapagain, D. P. & Sharma, S. (2008). *Land reform in Nepal: Where is It Coming from and Where is It Going?* Kathmandu: Authors.
- World Bank. (2013). *World Development Indicators 2013*. Washington, D.C: The World Bank.
- Wu, S., Devadoss, S. & Lu, Y. (2003). Estimation and Decomposition of Technical Efficiency for Sugar-beet Farms. *Applied Economics*, 35(4), 471-484.