Structural Change and Per Capita Income in Nepal: Empirical Evidences[#]

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Abstract

This paper empirically examines Nepalese economic structure by applying OLS technique on the annual series of sectoral growth, population and capital related variables ranging from 1975 – 2012. The estimates obtained with due consideration of stationarity of the series including HP filter revealed that industrial sector is significant to increase per capita income compared to the agriculture and service sectors in Nepal. Moreover, health as indicated by life expectancy and population at working age are found to be substantial to increase the income but, education and capital formation are found insignificant. It is inferred that employment matters for raising per capita income, requiring employment-led growth rather mere growth of economic sub-sectors. Hence, it is needed to have balanced contribution of economic sub-sectors and their employment share to national economy along with healthy workforce to raise the per capita income.

Key Words: Structural Change, Employment, Per Capita Income, Nepalese Economy

JEL Classification: O10, O49, L16, N10

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I. INTRODUCTION

Economic growth of the country is always a major concern worldwide since rise in GDP is one of the major human welfare indicators. Direct correlation is found between increased real output and income, with improvements in development factors in the history (Welker, 2012). Higher GDP growth not only provides better opportunities to improve access over basic requirements for the livelihood, but also provides more saving and revenue to the government. Nevertheless, economic transformation from rural agricultural to modern industrial or service sectors is the fundamental requirement to achieve high and sustainable growth. This can be said as the rapid and sustainable economic development in most of the developed as well as emerging economies has been achieved with the permanent shifts in their economic structure over the long-run. They have experienced a gradual transformation of the economy from rural subsistent agriculture to the modern industrial and then ultimately to the service dominant.

Although there are ample resources such as sufficient arable land, natural resources and labour force, Nepal is still among the poorest countries in the world as the latest human development index ranked the country 157th out of 187 and the rank for per capita income is 207th out of 229 countries (based on purchasing power parity). Nevertheless, the rank is 35th in labor force availability and 46th in percentage of arable land (CIA Fact Book, 2013). Likewise, Nepal is ranked fifth in employees per hectare, requiring 3.6 people to cultivate one hectare of land.

Economic growth is predominantly determined by the performance of agricultural sector in Nepal. This sector contributes more than one third to the country's gross domestic product (GDP) and employs about two-thirds of the total labour force inferring a low productivity. Moreover, the country experiences a monsoon-based growth as it witnesses an improved agricultural GDP at the time of favorable rainfall (Acharya & Bhatta, 2013). With these scenarios, Nepal witnessed a 4 percent growth of the economy on an average in recent ten years, in which agriculture and industry sectors had grown by 3.3 percent and 2.7 percent respectively whereas services sector had witnessed a growth of 5.3 percent. The share of agriculture was gradually declining over the study period whilst the share of services steadily increasing, being more than 50 percent in 2013 and 2014. However, the industrial share to GDP was found to be increasing until late 1990s and started declining.

The aforesaid facts and figures clearly depicts Nepalese economy's gradual structural shift from agro to services sector lead economy. However, problem can be witnessed in the employment pattern. The agriculture sector contributes only one-third to the economy but more than 64 percent of the total employment is on this sector. Similarly, the contribution of service sector to the economy has been growing rapidly but the total employment share of it is around 15 percent. In this milieu, this paper attempts to examine the Nepalese economic structure more closely by comparing and contrasting with the prominent literatures and prescribing some perceived policies for high and sustainable growth of the economy.

The rest of the paper flows as follows. The next section reviews the prominent literature of structural change. Section three portrays the structural change of the Nepalese economy. Data and methodology are discussed in section four. Section five explains the results and findings and finally section six concludes the paper with some policy prescriptions for high and sustainable growth.

II. STRUCTURAL CHANGE MODELS AND LITERATURE

The economic structural change is often considered as a permanent shift in the fundamental structure of an economy, basically an agrarian economy shifts to either industry or service based. In many countries, it primarily involves a decline in share of agriculture to the GDP and a rise in share of services (Maddison, 1991; Buera and Kaboski, 2012). It is believed that without the structural change, modern economic development is impossible (Kuznets, 1971) which is mostly associated with promising growth and continuous transformation (Pasinetti, 1981) in the globalized and dynamic economic system. Although employment shares in manufacturing were previously thought to be increasing monotonically as countries develop (Uy et. Al., 2013), the rise of new world economic powers has been primarily determined by the rapid structural change of their economies, that is, the shift from mining and agriculture to manufacturing and then to skill and technology-intensive sectors (Olga and Lelio, 2010).

Lewis (1954) emphasizes the need to transform the structure of an economy from low labour productive agriculture sector to the high labour productive modern industrial sector. In the least developed countries (LDCs), a large population depends upon traditional rural subsistence sector with surplus labour and hence, such surplus labour can be transferred to a highly productive modern sector in the process of development. Observing the happenings in the United States, Fuchs (1980) emphasized the importance of services sector in the economy, particularly, the changing patterns of employment, which grew across western economies as time passed. Likewise, Fuchs (1980) argues that to augment the contribution of services sector, it is required to increase participation of females in labor force as working-wives are likely to spend more out of their earnings to the services compared to males.

Besides the development of primary and secondary sectors, Fisher (1939) advocated about the emergence of large services sector for the economic progress, also known as tertiary sector development. Later on, Clark (1940) established the Fisher's theme as a tertiary sector development model. Fisher-Clark approach of structural transformation explains that large amount of labour force working in the services sector will lead the country to the development and high-growth. The model proposes two significant factors in the emergence of service sector, i.e., high income elasticity of demand and low productivity of labor in services. Fisher-Clerk analogy is further supported by Cost Disease Hypothesis of Baumol (1967). This hypothesis argues that there will be shift to service from manufacturing due to low productivity, less progressiveness, higher costs and higher relative prices of service compared to manufacturing.

In the stage of economic development, innovation led by dissemination and imitation seems to be most dominant factor for structural change of the economy (Schumpeter, 1939) and structural changes especially in specific industry are significant determinants of aggregate income and growth (Pender, 2002). Todays' advanced economies had followed two most prominent growth strategies, short-run strategy for stimulating growth, and a medium to long-run strategy to sustain that growth (Ocampo, 2003; Haggard and Kaufman, 1983).

The emergence of international trade has also shifted the pattern of employment as we observe the decline in U.S. manufacturing employment as an effect of its trade with China (Autor, et.al., 2011). In addition, the gain received today by China and India from the external sector has been realized by the transformation of their economies. If they had not have emphasized on innovation and change towards industry and services, traditional garments and agricultural products would not have been sufficient to get advantage of international trade and investment to their economies (Rodrik, 2007). Nevertheless, the pattern of structural transformation varies with region, for instance, the path followed by developed economies and SAARC countries is different being heterogeneity in the transformation processes (Sawhney, 2010).

III. CHANGES IN ECONOMIC STRUCTURE: GLOBAL AND NEPALESE SCENARIO

3.1 Global Change in Economic Structure

As discussed earlier in section II, the structure of the advanced economies has a very low contribution of agriculture sector and predominance of service sector. Depending upon the individual economy, the contribution of industrial sector to GDP is found less than 50 percent from the beginning of study period, at the middle of agriculture and service. Likewise, the pattern of employment from agriculture, industry and services are similar in the contribution to GDP. A significant dominance of service sector in job opportunities has been observed as compared to the agricultural sector in most of the advanced economies (Figure 1 and Figure 2).

In emerging economies, share of each sector to the GDP has been oriented to catch the path of advanced economies, though some countries are still far behind. It can be identified as a declining share of agriculture and increasing share of services to GDP over time. But sectoral contribution to employment has yet to be balanced with the contribution to GDP in these economies. Thus, the structure of developed and emerging economies shows a similar trend in contribution to GDP and employment, however, the perfect balance on employment and sectoral share can only be observed in the advanced economies (Figure 1, Figure 2 Figure 3 and Figure 4). This issue is also discussed on the trend of Nepal's abut neighbors, India and China in the following section 3.2.

Figure 1: **Economic Structure and Employment of United States**

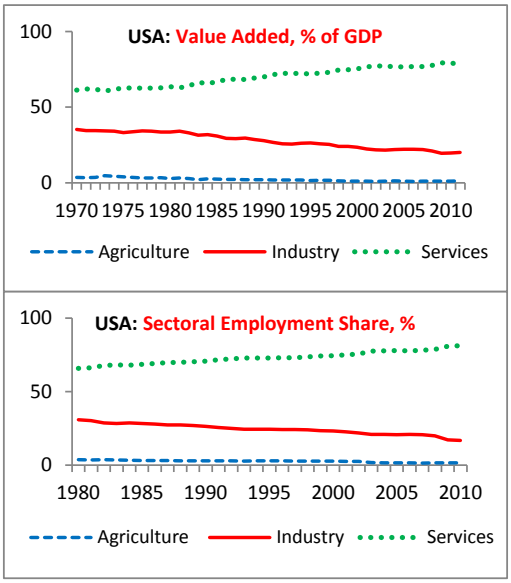
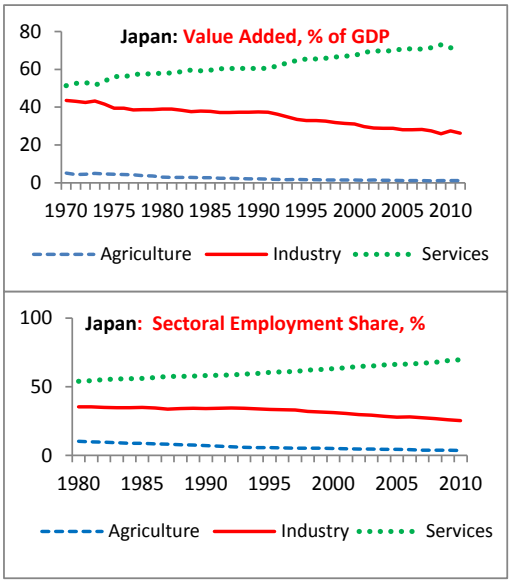


Figure 2: **Economic Structure and Employment of Japan**



Data Source: World Development Indicators, World Bank.

Figure 3: Economic Structure and Employment of Philippines

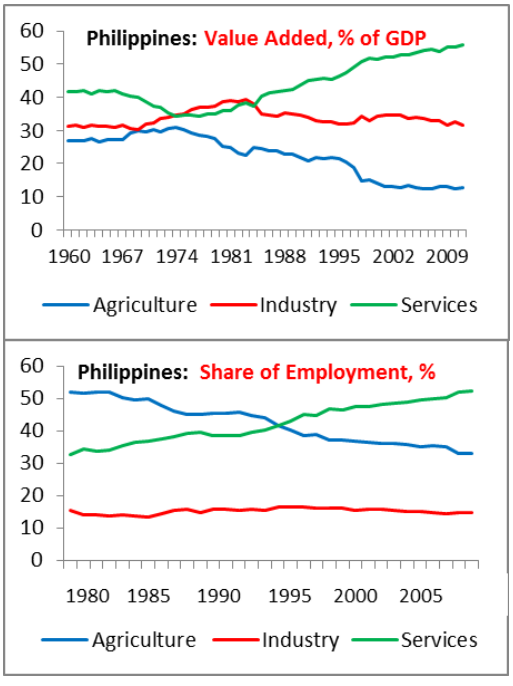
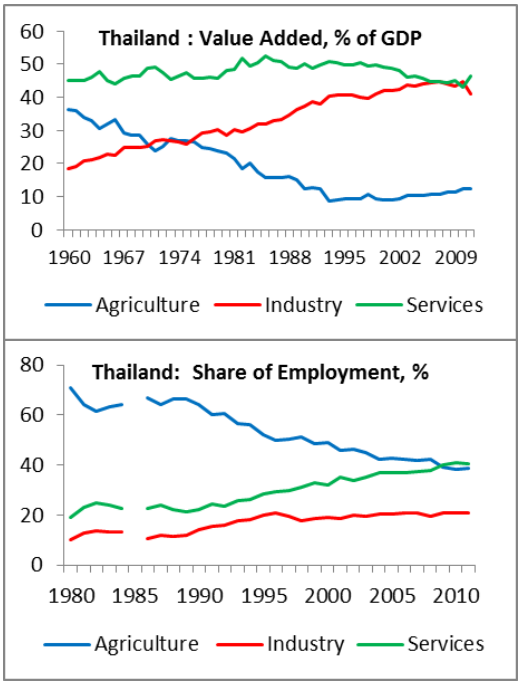


Figure 4:Economic Structure and Employment of Thailand



Data Source: World Development Indicators, World Bank.

3.2 The Indian and Chinese Economic Structure

Economic structures of two giant Nepalese neighbors namely China and India are substantially different than the structure of advanced economies. Although Chinese economy gives a different picture, Indian economy still possess some fundamental structural problem. In India, service sector has 57 percent share to GDP whereas agriculture sector accounts for 17 percent in 2012.The problem for India is observed in employment pattern as in Nepal. In 2010, for instance, the contribution of agriculture and service to GDP are 18 percent and 54 percent respectively but contribution to the employment of those sectors for the same year accounted for 51 percent and 27 percent respectively, indicating a low productivity in agriculture and little contribution of service sector towards the employment generation. Nonetheless in China, the contribution of industrial sector to GDP has been 47 percent in 2010 being continually the largest sub-sector of the economy but for providing employment, the sector is at the lowest level with 29 percent. Similarly, service sector in China has 43 percent shares in the GDP with 35 percent contribution to employment generation in 2010. Compared to Nepal and India, Chinese economic structure has been better in productivity and in employment generation. But the problem is in industrial employment in China; though the contribution to GDP is the highest, it is the lowest in employing population (Figure 5 and Figure 6).

Figure 5: **Economic Structure and Employment of China**

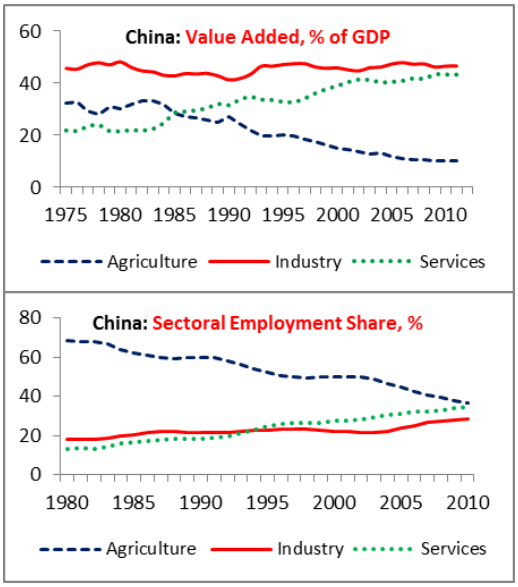
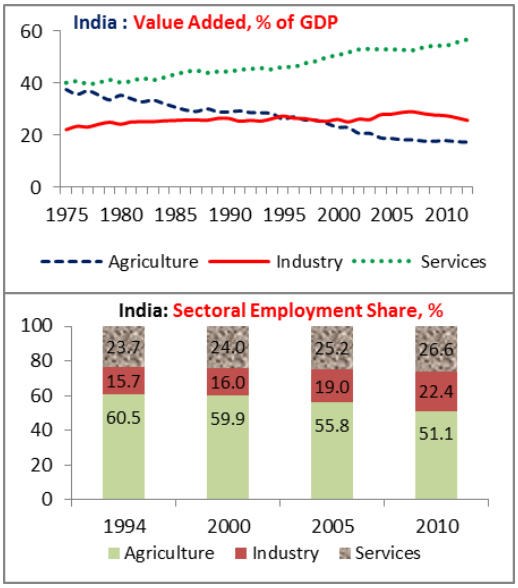


Figure 6: **Economic Structure and Employment of India**



Data Source: World Development Indicators, World Bank.

3.3 Structure of Nepalese Economy

Even though Nepal has sufficient natural resources and labour force among others, the historical average GDP growth rate is just about 3.7 percent since 1960 onwards

(Figure 7). The industrial growth remained more unstable throughout the study period relative to the growth of agriculture and service (Table 1and Figure 8).

Table 1: **Standard Deviations of Nepal's Growth**

Sector	Full Sample	1991 Onwards
Agriculture	3.3	2.2
Industry	7.2	4.0
Services	3.0	2.3
Aggregate	2.5	1.6

Source: Author's Calculation

Figure 7: **Real GDP Growth Rate in Nepal**

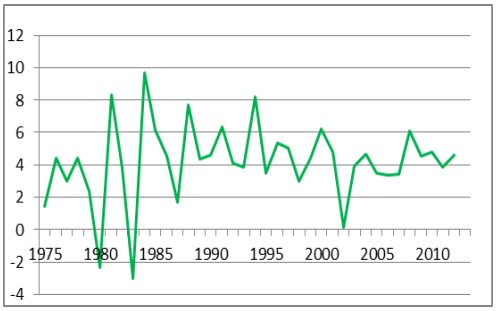
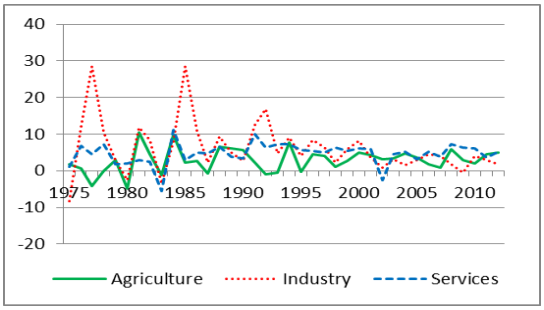


Figure 8: **Sectoral GDP Growth Rate in Nepal**

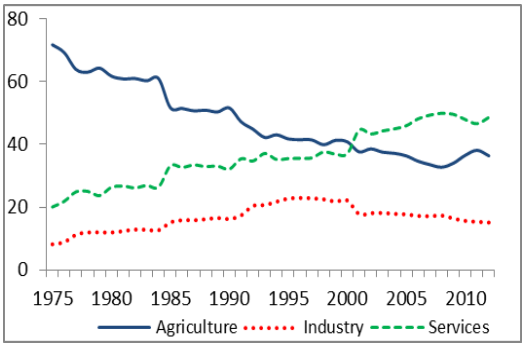


Data Source: World Development Indicators, World Bank.

According to Nepal Labor Force Survey (NLFS) 1998/99, of the total labour force, 76 percent were engaged in agriculture, 10 percent in industry and 14 percent in service. After about one decade, as NLFS-2008 presented, 74 percent were in agriculture, 11 percent in industry and 15 percent in services – not much different from 1998/99. Nevertheless, the share of these three sectors to the GDP had changed over that period. In 1998/99, the contribution of agriculture sector was 38 percent, industry 23 percent and services 39 percent. The share of service sector in GDP jumped up to 48 percent in 2008/09, while the share of industry declined to 16 percent. The share agriculture declined marginally to 36 percent in 2008/09. In 2012/13, agriculture sector contributed 34 percent; industry 15 percent and service sector 51 percent. In this way, the contribution of service sector has been increasing while that of agriculture and industrial sector has been declining (Figure 9). In short, a gradual change is observed in economic structure since the share of services sector to GDP exceeded the sum total of agriculture and industry sectors so far.

However, the major bottleneck in Nepalese economic transformation is employment pattern. It is believed that increased employment opportunities are the prerequisites for continued and sustained economic growth. In Nepal, nonetheless, we can observe a massive underemployment with very low productivity in agriculture. The opposite is the case of services as the contribution to economy is more than half but it provides employment for only 15 percent of work force. From the economic sense, however, the industrial sector is still playing vital role with closer similarities in contribution to both GDP and employment opportunities (Figure 10).

Figure 9: **Sectoral Contribution in the GDP in Nepal**



Data Source: World Development Indicators, World Bank

Figure 10: **Share of Sectoral Employment in Nepal**

Data Source: Nepal Labor Force Survey, 1998/99 and 2008.

IV. DATA AND METHODOLOGY

The paper follows the methodology of Pender (2002) to identify the determinants of structural change variables with slight modification. As Pender (2002) uses the concept with dynamic panel data analysis of OECD countries, the same technique has been adopted here only for Nepalese data to model ordinary least squares (OLS).

Since per capita income of an economy is total production of the country within a year divided by the total population, factors that may cause to change income can be hypothesized as:

PCI = f(agri_growth, ind_growth, ser_growth, edu, health, pop, popw, capital, others)…(1)

Here, PCI refers to per capita income, agri_growth, ind_growth and ser_growth is the growth of three major economic sectors namely, agriculture, industry and service. The level of education (edu), health condition, total population and working population (pop, popw), capital injection and other variables are presumed to be the major determinants of per capita income. More precisely, based on this income hypothesis, the income model can be estimated as:

$$PCI_t = \alpha + \beta_1 AGRI\_CG_t + \beta_2\, IND\_CG_t + \beta_3 SER\_CG_t + \beta_4 EDU_t + \beta_5\, GFCF_t + \beta_6 LE_t + \beta_7 POP_t + \beta_8 POPW_t + \varepsilon_t \quad \ldots (2)$$

Where, per capita income (*PCI*) is the nominal annual US dollar per capita income in purchasing power parity. Growth rate of share of agriculture, industry and services are termed as *AGRI_CG*, *IND_CG* and *SER_CG* in the model, which is the percentage growth of sectoral contribution into the total Nepalese GDP, calculated as follows.

$$\text{AGRI\_CG} = \left[\left\{\frac{\text{Agricultural GVA}}{\text{Total GVA}} \times 100\right\}_t - \left\{\frac{\text{Agricultural GVA}}{\text{Total GVA}} \times 100\right\}_{t-1}\right] \times 100\text{-}100 \quad \ldots (3)$$

$$IND\_CG = \left[\left\{\frac{\text{Industrial GVA}}{\text{Total GVA}}\times 100\right\}_t - \left\{\frac{\text{Industrial GVA}}{\text{Total GVA}}\times 100\right\}_{t-1}\right]\times 100\text{-}100 \quad \ldots (4)$$

and

$$SER\_CG = \left[\left\{\frac{\text{Services GVA}}{\text{Total GVA}}\times 100\right\}_t - \left\{\frac{\text{Services GVA}}{\text{Total GVA}}\times 100\right\}_{t-1}\right]\times 100\text{-}100 \quad \ldots (5)$$

Life expectancy (*LE*) is the expected years of life at birth, total population (*POP*) is the total number of population in million residing in the country and population at working age (*POPW*) is the population in million, with 15 to 64 years. The above data are obtained from World Bank Database.

Gross fixed capital formation (*GFCF*) is the annual fixed capital formation in million rupees, obtained from national accounts statistics published by central bureau of statistics (*CBS*). Years of schooling (*EDU*) is the average year of schooling of working age population, calculated by multiplying currently available information of enrollment of the students ranging from primary school to advanced university degree that is obtained from Economic Survey (Various Editions).

The augmented Dicky-Fuller (ADF) test for unit root has been presented below (Table 2).

Table 2: **Augmented Dickey Fuller (ADF) Test for Unit Root**

Variable	Level		First Diff	
	t-Stat	P Value	t-Stat	P Value
AGRI_CG	-5.93	0.000		
IND_CG	-4.59	0.001		
SER_CG	-7.57	0.000		
LOG(GFCF)	-0.78	0.813	-6.786	0.000
EDU	-1.51	0.518	-8.183	0.000
LE	-2.90	0.058		
LOG (LE)	-3.24	0.028		
Log (PCI)	0.61	0.988	-6.475	0.000
Log (PCI) @ Trend (AIC)	-3.303	0.086		
POP	0.72	0.991	2.822	0.066
Log(POPW)	-0.16	0.934	3.134	0.034

Source: Author's calculation

The Augmented Dickey Fuller (ADF) test for unit root shows the variables *AGRI_CG, IND_CG, SER_CG* and *LE* are stationary at level whilst rests are found to be non-stationary. After first difference, log (*GFCF*), *EDU, POP* and *log(POPW)* become stationary. Nonetheless, per capita income (*PCI*) variable shows a trend stationary nature. When time trend is included in the test equation, *PCI* is found to be stationary at 10

percent significance level and *log(PCI)* at 5 percent significance in even in level data (Table 2).

Hence, to address the trend stationarity of *PCI*, the Hodric-Prescott (HP) filter is applied to extract trend and cycle from *PCI*. The HP filter generates new cycle and trend from the trend-stationary series that minimizes the variance of the old series around the new one, subject to a penalty constant λ. Once trend and cycle is extracted, we can use cycle in the regression equation. Hence, in case of *PCI*, the filter chooses PCI_Cycle_t to minimize:

$$\sum_{t=1}^{T}(PCI_t - PCI\_Cycle_t)^2 + \lambda \sum_{t=2}^{T-1}\big((PCI\_Cycle_{t+1} - PCI\_Cycle_t) - (PCI\_Cycle_t - PCI\_Cycle_{t-1})\big)^2 \quad \ldots (6)$$

By applying this method, the new series of per capita income, pci_cycle_t, which is trend-stationary free and contains all the information of *PCI* too.

Based on Pender (2002)'s modeling framework and considering the nature of data and properties, the best fit model can be presented as follows.

$$PC\_Cycle_t = \alpha + \beta_1 AGR\_CG_t + \beta_2 IND\_CG_t + \beta_3 SER\_CG_t + \beta_4 \Delta EDU_t + + \beta_5 \Delta(\log(\mathrm{GFCF}))_t + \beta_6 \log(LE)_t + \beta_7 \Delta(POP)_t + \beta_8 \Delta(\log(POPW))_t + \beta_9 dum01 + \varepsilon_t \quad \ldots (7)$$

Equation (7) illustrates the prime factors in influencing per capita income of the citizens in an economy. In addition to the equation (2), one additional dummy variable is introduced. Dummy variable (*dum01*) is the variable with value one if the year of analysis is 2001 and zero otherwise, which is used to capture compilation break from 2001 as Nepal switched in accounting GDP with new system of National Accounts (SNA), 1993 with the broad categorization of the sectors especially that of services.

The impact of sectoral growth variables is assumed to be positive for per capita income. Level of education, as explained by EDU_t is also expected to increase the income since education is a human capital. Gross fixed capital formation is assumed to impact positively to income as capital is most significant factor for productivity increment and high growth. Effect of Life expectancy *(LE)* and population at working age *(POPW)* are also hypothesized to have positive impact on per capita income. Nevertheless, total population *(POP)* is presumed to reduce the income, as the population rises, income is to be distributed among citizens.

There may be the possibility of multi collinearity among the regressors. To identify whether there exists serious collinearity problem, variance inflation factor (*VIF*) has been estimated. VIF helps quantifying the inflation of the variance due

to the collinearity with other regressors in the estimated equation. The VIF factor for $\widehat{\beta}_i$ have been calculated as follows:

$$VIF = \frac{1}{1-R_i^2} \quad \ldots\ldots (8)$$

V. MODEL ESTIMATION AND RESULT ANALYSIS

Equation (7) is estimated by applying ordinary least squares (OLS) method of estimation in EViews 8. The estimated coefficients of equation (7) have been presented in Table 3.

Table 3: Empirical Results

S.N.	Variable Name	Coefficient	t-Stat
1.	Constant	- 166.24	-2.196**
2.	$AGRI\_CG_t$	0.695	0.597
3.	IND_CG_t	0.936	2.251**
4.	SER_CG_t	- 0.092	-0.139
5.	ΔEDU_t	-5.017	-0.452
6.	$\Delta\log(GFCF)_t$	8.32	0.314
7.	$Log(LE)_t$	32.62	1.742*
8.	ΔPOP_t	-93.12	-2.081**
9.	$\Delta\log(POPW)_t$	3032.91	3.431**
10.	Dum01	50.71	3.088**

**=significant at 10 percent level ** = significant at 5 percent or less level*

*Adj. R^2= 0.41, DW = 1.6, F-Stat = 3.60***

Source: Author's calculation.

In contradiction to the hypothesis, coefficient of $AGRI\_CG_t$, represented by the growth rate of the agricultural share to the GDP, is found with positive sign and SER_CG_t with a negative, both the coefficient are insignificant though. The IND_CG_t, which represents the growth rate of industrial share to GDP, has expected sign and is significant at 5 percent level indicating that increased share to industrial GDP has a vital role in increasing per capita income.

The reason behind the insignificance of agriculture sector could be justifiable. Agricultural productivity matters for other sectors development too, as very low agricultural productivity can severely damage modernization of economy (Kim & Whang, 2012). Moreover, Nepal's agriculture is largely at sustenance level, being high level of underemployment and only 40 percent farmer produce sufficient foods for one year's consumption (CBS, 2013)[1]. As discussed before in section three and proved statistically, the industrial sector is still playing vital role in raising per capita income only

[1] Nepal Living Standards Survey-III reveals 32 percent underemployment in all sectors and share of wage employment in agriculture is just 2.8 percent compared to 12.6 percent in non-agriculture. Moreover, share of self-employment in agriculture is still 61 percent, only 10 percent down from 1996 level.

due to the closer similarities in contribution to both GDP and employment opportunities. As the sector contributes about 15 percent to the economy by employing 11 percent of total employment, it is the closest combination in the share to employment and to the GDP so far.

Nonetheless, there is also strong evidence on the insignificance of the service sector. The case of service sector is like the opposite the case of agriculture in terms of employment. Service sector's contribution to economy is more than half but it provides employment only for 15 percent of the total employed. With this, from income perspective, service sector's growth is still playing no role till date. Unless it absorbs the workforce at a speed of its growth and then its sectoral contribution to the national economy, it would not raise the living standards of societies.

As hypothesized earlier, both life expectancy and population at working age have significant positive impact to per capita income; the coefficient of $log(LE)_t$ is significant at 10 percent level and $log(POPW)_t$ at 5 percent or lower level. These statistical results can be inferred as the improved health condition and young working groups foster the overall per capita income. As presumed before, increase in country's population reduces per capita income, ΔPOP_t significant at 5 percent or lower level. The dummy variable, *dum01* is significant at 5 percent or lower level. Hence, it has captured the compilation break of services sector in 2001.

Nevertheless, education and gross fixed capital formation have been found insignificant to raise income. Although the sign of $\Delta log(GFCF)_t$ is positive as expected, the sign of ΔEDU_t is even negative. This contradictory finding, that is, the growth of industrial share to GDP is significant but capital formation is not increasing the income can be argued as follows. These two phenomena have been regressed with different scenarios, as the former indicates the sectoral growth in the share to the total production of the economy, and the later, with one of the factors of production that usually input for all three sectors in aggregate (agriculture, industry and services). Although capital injection may increase the productivity, the productive use of capital matters which may be suffering in Nepal (Bhatta, 2014)[2]. Most importantly, capital injection should directly hit the income of the people, especially in employment creation; this might have missing in Nepalese context.
On the other hand, the insignificance of the education variable as measured by years of schooling of working age population could be due to the couple of reasons. The increased number of outgoing migrants in the recent years (and impact of remittance on the education is still to witness), lack of labor movement from agriculture, being high share of underemployment, lower level of vocational trainings etc. may be impeding the role of education to the national economy. Besides, it is also witnessed a large chunk of educated unemployment in Nepal, educated youths being unable to get job due to the 'lack of access to relevant education and training, and lack of information' among others (United

[2] This issue has been highlighted in an article at The Himalayan Times, March 11, 2014.

Nations, n.d., and Sharma, 2013). The unemployed youths tend to get higher education, which is easily accessed without any qualifying exam restrictions in Nepal. Besides these all, there may the minor adjustment possibility of education data used in analysis since the education data is computed self. Nevertheless, change in sign with large variation in the coefficient couldn't be expected even after the revision of the series.[3]

So that, the insignificance of education and capital variable indicates that both the current level of education and capital injection have not contributed significantly to increase per capita income. Thus, it is essential to enhance the level of education and capital formation drastically in the days to come if Nepal intends to increase income of the people through education and investment as in advanced and emerging economies. This can be inferred on the basis of literature supports in the importance of capital, both human and physical, in OECD and other emerging economies.

The goodness of fit, diagnostic and stability tests satisfy the minimum criteria required for the statistical inference. The Lagrange multiplier (LM) test for autocorrelation shows no serial correlation in residual as p-value of the test is 0.64. The residual plot of the model shows a random move around mean (Annex I - Figure 12). The stability test of the model is also significant since the recursive estimates represented by CUSUM and CUSUM squares test for stability lie within 5 percent range (Annex I - Figure 13).The adjusted R^2, Durbin-Watson statistics and F-Stat for overall model significance show the satisfactory results.

The VIF estimates for identifying the multi-collinearity among the regressors has been presented in Table 4.

Table 4: Variance Inflation Factor (*VIF*) Estimates

Variable	Centered VIF
AGRI_CG	**7.82**
IND_CG	3.22
SER_CG	**6.39**
D(POP)	4.48
D(LOG(POPW))	3.82
D(EDU)	1.07
LOG(LE)	1.81
DUM01	2.43
D(LOG(GFCF))	1.51

Source: Author's calculation

[3] The negative sign of coefficient of EDU_t is something weird in our estimation. Perhaps, a significant variation may not result even if the education data is revised. The estimated data are near to the official published series for the specific years. See annex II-A for the details.

Generally, a very low value of VIF is the indication of no multi-collinearity problem, in which some researchers say only below 5 is the tolerable, for instance, Rogerson (2001). However, many researchers such as Neter et al., 1989: 409; Hair et al., 1995; Marquardt, 1970; Mason et al., 1989 have set the centered VIF below 10 as a tolerable limit for collinearity. In our VIF estimates, all the values of the centered VIFs are below 10. The VIFs of $AGRI\_CG_t$ and SER_CG_t have been found relatively higher but within the tolerable limit.

The empirical findings, hence, suggest the requirement of an employment-generating economic growth. Even though we may achieve a higher sector-specific growth, the concern would be whether there is new employment generation. The message is that the balance of contribution to the GDP and to the total employment is a must for increasing income of people.

VI. CONCLUSION

Although the contribution of industrial sector does not change much in Nepal, historical data shows a gradual shift in the share of economy from agriculture to services. But the employment pattern has not changed in line with the change in sectoral composition of GDP. Unbalanced contribution of agriculture, industry and service sectors is found in the share of GDP and total employment.

In Nepal, empirical estimates show that industry is the most significant sector to increase income compared to agriculture and service sectors. Improvement in health is also found significant to increase per capita income. Besides, working age population contributes to enhance per capita income of total population. Nevertheless, as against the theory and international empirics, capitals both human and physical have been found not contributing to raise per capita income, being investment and education variables insignificant in the empirical analysis. This could be because increased educated unemployment and lack of productive investment.

The unbalanced contribution of employment, that is, high subsistence on agriculture and very low employment by the service sector could be blamed as the insignificance of these sectors in increasing the income. Hence, it is the major structural problem in Nepal-deviation in economic and the employment structure especially higher level of underemployment and eroded productivity in agriculture and employment unfriendly service sector. Industrial sector relatively observed better in increasing per capita income as the sector is much closer in employment generation and the share of the economic growth.

Thus, employment generation is the utmost importance in an economy to raise the income of the people, so is for Nepal. In addition, improved health and larger share of working age people are also needed. The focus should be on increasing the productivity of the agriculture sector and move agriculture-based labors to other sectors of economy. Nonetheless, massive employment can only be generated with increased productive investment in the aforesaid sectors.

The paper can be further improved by analyzing the panel data of similar economies that helps in identifying random and fixed effect estimations much comprehensively.

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Appendix I

Figure 11: **Hodrick Prescott Decomposition**

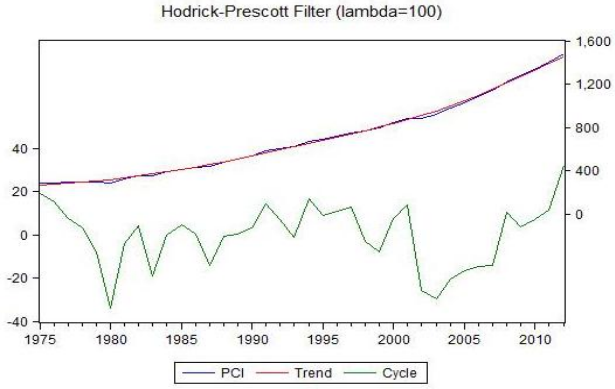


Figure 12: **Residual Plot of the Model**

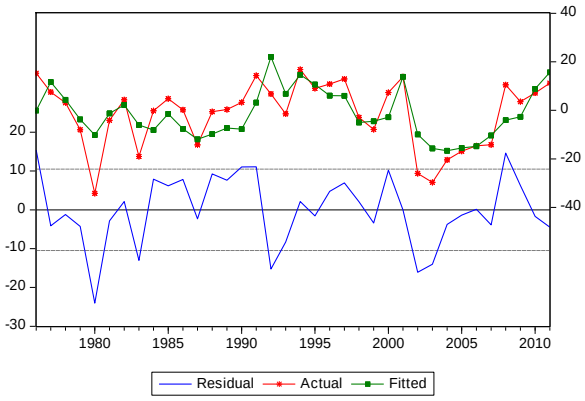
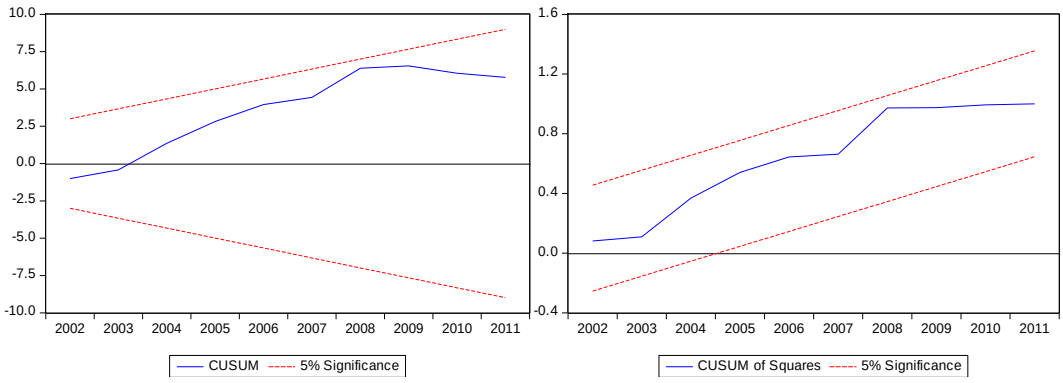


Figure 13: **Stability Tests of the Model**



Appendix II

A. Data on Average Years of Schooling for Population and Working age, 15-64 years

Year	Total Population, Million	Population at Working Age, Million	Average Years of Schooling	UNDP Data[4]
1975	12.87	7.16	0.86	
1976	13.16	7.31	0.93	
1977	13.45	7.46	1.05	
1978	13.75	7.62	1.15	
1979	14.06	7.78	1.34	
1980	14.38	7.95	1.42	0.6
1981	14.72	8.12	1.47	
1982	15.06	8.30	1.54	
1983	15.42	8.48	1.60	
1984	15.78	8.67	1.55	
1985	16.14	8.85	1.70	
1986	16.51	9.03	1.67	
1987	16.89	9.21	1.73	
1988	17.27	9.39	1.83	
1989	17.68	9.60	2.07	
1990	18.11	9.83	2.31	2.0
1991	18.57	10.10	2.40	
1992	19.05	10.39	2.47	
1993	19.55	10.71	2.41	
1994	20.07	11.03	2.40	
1995	20.59	11.36	2.37	
1996	21.12	11.69	2.47	
1997	21.65	12.02	1.89	
1998	22.18	12.34	2.50	
1999	22.69	12.65	2.58	
2000	23.18	12.95	2.50	2.4
2001	23.66	13.22	2.63	
2002	24.10	13.47	2.66	
2003	24.53	13.72	2.74	
2004	24.92	13.96	2.87	
2005	25.29	14.20	3.01	2.7
2006	25.63	14.45	2.98	2.8
2007	25.95	14.69	3.01	2.9
2008	26.25	14.96	3.13	3.0
2009	26.54	15.24	3.28	3.1
2010	26.85	15.56	3.22	3.2
2011	27.16	15.92	3.21	3.2
2012	27.47	16.31	3.09	3.2

Data Source: Total Population and Population at Working Age Data is downloaded from World Bank Database and Average Years of Schooling Data is self-calculated by using school enrollment data available fr om Economic Survey,. Various Issues.

[4] Average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level. The data is put here for the reference, obtained from United Nations Human Development Indicators Accessed: 2/25/2013, at http://hdr.undp.org.

B. Other data series used in analysis

Year	GFCF Million, NPR	IND_G	SER_G	AGRI_G	PCI, PPP USD	PCICYCLE (HP Filtered)
1975	2223.0	NA	NA	NA	281.6	19.05878
1976	2443.0	8.301994	8.890165	-3.432291	287.6	15.29110
1977	2580.0	26.50899	13.87903	-7.764521	289.8	7.541765
1978	3294.0	6.529822	0.561690	-1.363254	295.9	3.168187
1979	3263.0	0.370499	-5.285280	2.027867	296.3	-7.985212
1980	3681.0	-0.518811	11.00017	-3.956940	282.9	-34.18853
1981	4299.0	3.736784	1.614016	-1.408213	327.6	-4.086187
1982	5465.0	3.999741	-2.237120	0.170157	352.5	4.321822
1983	6576.0	-0.467740	2.925061	-1.154514	347.3	-19.03958
1984	6907.0	-1.562553	-1.819503	1.143192	386.2	-0.192662
1985	9386.0	19.92926	25.63819	-15.21721	412.9	4.774010
1986	9431.0	4.953289	-1.540583	-0.458424	431.6	0.195859
1987	11825.0	-0.174051	2.383194	-1.458986	441.7	-14.24678
1988	13414.0	2.159217	-1.540314	0.342023	481.3	-0.560529
1989	16392.0	2.274153	0.471022	-1.027216	509.1	0.312850
1990	17002.0	-1.812131	-2.897028	2.497816	539.7	3.265048
1991	22780.0	6.940153	10.24382	-8.557058	578.9	14.31836
1992	29277.0	17.47837	-1.934237	-4.976672	599.8	6.774899
1993	37278.0	1.290158	6.833271	-5.877285	620.3	-1.438216
1994	42032.0	5.101934	-5.102471	1.987817	667.4	16.79517
1995	48370.0	4.783464	0.767073	-3.039191	688.7	9.083011
1996	56081.0	0.710507	0.258643	-0.606958	719.7	10.83688
1997	60794.0	-0.228906	0.351942	-0.175306	751.7	12.95151
1998	65375.0	-1.624526	5.315892	-3.684482	766.6	-2.929753
1999	65269.0	-3.036574	-1.869622	3.473210	793.7	-7.870098
2000	73324.0	1.480300	0.404737	-1.143537	842.8	7.363763
2001	84750.5	-19.60559	20.28716	-7.782908	885.3	13.84589
2002	89889.3	1.672383	-2.793550	2.516736	884.0	-26.02243
2003	98072.8	0.315668	2.293923	-2.723048	922.1	-29.71056
2004	109181.3	-1.603388	1.482795	-0.975243	976.6	-20.39875
2005	117538.9	-0.900514	2.190292	-2.217146	1028.9	-16.86215
2006	135532.0	-2.815206	4.798017	-4.695526	1083.1	-14.64082
2007	153336.9	-0.604771	2.461346	-3.121590	1138.5	-14.19630
2008	178445.5	1.403537	1.198472	-2.477033	1220.6	10.54934
2009	211039.0	-5.551835	-0.686357	3.987479	1272.8	3.586678
2010	264888.0	-4.502185	-3.374023	7.327898	1336.8	7.142556
2011	292730.0	-1.939240	-2.733647	4.408893	1402.1	11.21697
2012	307384.0	-1.552970	4.311903	-4.645298	1484.3	31.97413

Note: The data of 1975 represents the Nepal's fiscal year 1974/75, 1976 as fiscal year 1975/76 and so on in the whole data sets.

Data Source: World Development Indicators, the World Bank and Central Bureau of Statistics, Kathmandu, Nepal.