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Determinants of Housing Demand in Urban Areas of Pakistan: Evidence from the PSLM

AYAZ AHMED, NASIR IQBAL, and REHANA SIDDIQUI

The study attempts to investigate the determinants of housing demand in urban areas of Pakistan. The empirical analysis is carried out using the Pakistan Social and Living Standard Measurement (PSLM) survey 2004-05 and 2010-11. The hedonic price model is used for the estimation of house prices. In order to control the selectivity bias between the tenure choice and the quantity of housing services demanded, Heckman's two-step selection procedure is used. The empirical analysis shows that housing price and income (temporary and permanent) play an important role in the determination of the housing units' demand. An increase in houses' prices causes decrease in demand for the housing units while the housing demand increases when the permanent income increases. On the face of change or increase in the transitory income, the demand for housing units remains static, since people do not desire to make long-term decisions based on volatile income. To manage rising housing demand, government should focus on developing effective and enforced price control mechanisms.

Keywords: Urban Housing Demand, PSLM, Pakistan

1. INTRODUCTION

Housing is a basic human need and millions of people struggle to have a roof over their heads. In the face of unprecedented urbanisation and population growth many cities have accrued huge housing shortages, especially in developing and emerging economies. Estimates show that in 2010 around 980 million urban households lacked decent housing, as will another 600 million between 2010 and 2030. One billion new homes will be required worldwide by 2025, costing an estimated amount of $650 billion per year [UN-Habitat (2016)]. Although hundreds of new housing colonies have been established, the problem of finding a suitable accommodation in big cities persists. In 2014, more than 30 percent of urban population resided in slums in developing countries. Since every household is not able to build a house for itself, there is always a demand for rental houses. Housing, therefore, as a basic need became a challenging outlay of rapid urbanisation in most of the developing countries [UN-Habitat (2016)].

Housing demand is simply a housing need, which is backed up by the ability and willingness to pay. It depends on the different forms of behaviour of individuals, that how various households spend their limited resources, to fulfil their needs of housing units as well as their need for goods and services. The need of urban housing is affected by a

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number of factors, such as: rural to urban migration, increasing population, low investment in housing development, low purchasing power of household, poor urban infrastructure and geography [Fontenla, Gonzalez, and Navarro (2009); Oktay, Karaaslan, Alkan, and Kemal Çelik (2014); Saiz (2010)].

Pakistan is a developing country that accommodates the world's sixth largest population. The housing situation has remained under pressure in Pakistan. Pakistan has been confronting housing issues in both qualitative and quantitative terms. Pakistan is faced with a severe shortage of housing, particularly for low and middle-income groups. Estimates disclosed that there is a shortage of about 7.5 million housing units [SBP (2013)]. The gap between supply and demand is increasing by more than 0.35 million. This issue is more critical in urban regions, where accessibility of sufficient residences at affordable rents is getting scarcer by the day. Population growth, rising urbanisation and economic development have created huge housing backlog, especially in big cities. This has not only increased the need for new housing units, but has also created a huge burden on the existing housing units. The existing work on housing in Pakistan by Pasha and Ghaus (1990), Lodhi and Pasha (1991), Ahmed (1994) and Pasha and Butt (1996), represents the first few attempts at determining factors that affect housing demand. Very few studies have ventured into determining the housing demand across income groups [Shefer (1990) and Tiwari and Parikh (1998)].

Given this background, the prime objective of this study is to analyse the housing demand in urban areas of Pakistan. This study attempts to determine empirically, how the factors such as wealth, income and house prices influence the ability to own a house differently for low, middle and high-income groups. This study compares the influence of socio-economic factors on the housing demand for two different time periods i.e. 2004-05 and 2010-11. In 2004-05, the housing market boomed while in 2010-11 the housing market was faced with recession.

This study makes a significant contribution to literature in various contexts. First, the study identifies all the possible factors, affecting the housing demand at national, provincial and income groups' levels. Second, this study compares the influence of socio-economic factors on housing demand for two different time periods i.e. 2004-05 and 2010-11. In 2004-05, the housing market was at its boom while in 2010-11 housing market was faced with recession. Both periods, therefore, have different implications for housing demand. This comparison helps in designing appropriate policies according to the contemporary state of the housing market. Different factors contribute differently towards housing demand on the face of two contrast economic cycles.

Following the conventional housing studies, this study determines a house price by employing the hedonic price model. Unlike most studies on developing countries, this study quantified the relationship between the housing demand and its covariates, by using an econometric framework, augmented by Heckman's two-step selection procedure that controls selectivity bias between the tenure choice and quantity of housing services demanded. Margins for probability of house ownership are calculated by using the Probit model. Permanent and Transitory income is also estimated according to the permanent income hypothesis. Another aspect, not commonly found in studies for developing countries, including Pakistan, is determining the separate effect of permanent and more importantly transitory income on housing demand. The log-linear model is estimated using the Ordinary Least Square (OLS) technique.

The rest of the paper is organised as follows: section 2 presents the state of housing in Pakistan with special focus on National Housing Policy; section 3 layouts the conceptual framework of the study, describes data and estimation methodology; section 4 explains the results and last section concludes the discussion with policy suggestions.

2. STATE OF HOUSING IN PAKISTAN

According to Population Census 1998, the stock of housing units was 19.2 million in 1998. Figure 1 represents the distribution of housing units across the provinces. Figure 1 indicates that in 1998, 55 percent housing units were in Punjab, 26 percent in Sindh, 11.5 percent in KPK and 5.1 percent in Balochistan. The stock of housing units was 12.5 million in 1981.

Fig. 1. Distribution of Housing Units across Provinces
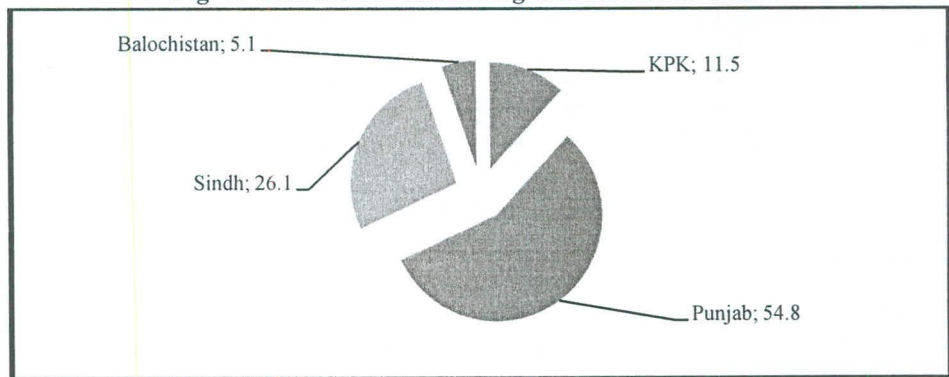
Source: Authors' own calculation based on the "Population Census 1998".

The housing units, as a percentage of the total population remained almost the same across provinces. The housing units as a percentage of the total population have declined from 14.6 percent in 1981 to 12.5 percent in 1998 in KPK. The housing units as a percentage of the total population have declined from 15.9 percent in 1981 to 14.3 percent in 1998 in Punjab. On the other hand, the housing units as a percentage of the total population has increased from 14.6 percent in 1981 to 16.5 percent in 1998 in Sindh and from 13.6 percent in 1981 to 14.8 percent in 1998 in Balochistan. The increase in housing units was primarily observed in rural areas of Sindh and Balochistan during that period. But, on the other hand, decline has been recorded in urban areas of Sindh and Balochistan during this period (Table 1).

Table 2 presents the "nature of tenure" at national level across the rural and urban areas. The nature of tenure was measured using three categories, including "owned house", "rented house" and "rent free house". The data uncovered that the owned dwellings have increased from 78.4 percent in 1981 to 81.2 percent in 1998. There was no significant change in the ratio of owned houses from 1998 to 2012-13. The statistics have established that around 86 percent dwellings are owner occupied (Table 2). Similar patterns have been observed across rural and urban areas of Pakistan. There was not a huge change across rural and urban areas in the ratio of owned houses from 1981 to 1998 (Table 2)

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Table 1

Housing Units (Trend Analysis)

Region	All Areas		Rural		Urban	
	1981	1998	1981	1998	1981	1998
Housing units (million)						
Pakistan	12.51	19.21	9.01	13.18	3.50	6.03
KPK	1.61	2.21	1.38	1.84	0.23	0.37
Punjab	7.53	10.54	5.57	7.34	1.96	3.20
Sindh	2.78	5.02	1.56	2.85	1.22	2.17
Balochistan	0.59	0.97	0.50	0.78	0.09	0.20
Housing units as percent of total across the rural urban						
Pakistan	100.0	100.0	72.0	68.6	28.0	31.4
KPK	100.0	100.0	85.7	83.3	14.3	16.7
Punjab	100.0	100.0	74.0	69.6	26.0	30.4
Sindh	100.0	100.0	56.1	56.8	43.9	43.2
Balochistan	100.0	100.0	84.7	79.9	15.3	20.1
Housing units as percent of total across the provinces						
Pakistan	100.0	100.0	100.0	100.0	100.0	100.0
KPK	12.9	11.5	15.3	14.0	6.6	6.1
Punjab	60.2	54.8	61.8	55.7	56.0	53.1
Sindh	22.2	26.1	17.3	21.6	34.9	36.0
Balochistan	4.7	5.1	5.5	5.9	2.6	3.2
Persons per housing unit						
Pakistan	6.73	6.89	6.70	6.78	6.83	7.14
KPK	6.87	8.03	6.81	8.01	7.39	8.08
Punjab	6.28	6.98	6.16	6.89	6.63	7.19
Sindh	6.84	6.06	5.26	5.47	8.85	6.84
Balochistan	7.32	6.76	7.40	6.40	7.78	7.85

Source: Population Census (1981, 1998).

Table 2

Nature of Tenure (Percentages) by Rural/Urban Areas

	1981			1998			2004-05			2010-11		
Nature of Tenure	All Areas	Rural	Urban	All Areas	Rural	Urban	All Areas	Rural	Urban	All Areas	Rural	Urban
All Types	100	100	100	100	100	100	100	100	100	100	100	100
Owned	78.4	82.6	67.7	81.2	86.8	68.9	86.6	92.8	78.4	85.9	91.2	75.7
Rented	7.7	2.2	21.9	8.6	2.2	22.7	8.1	1.5	16.8	8.1	2.0	19.9
Rent Free	13.9	15.2	10.5	10.2	11.0	8.4	5.3	5.7	4.8	6.0	6.8	4.4

Source: Population Census (1981, 1998); PSLM (2004-05 and 2010-11).

Various indicators are used to examine the level of congestions within the housing unit. In this context we use persons per housing unit, person per room, single room housing units, two rooms housing units and three to four rooms housing units. Census of 1981 and 1998 established that in Pakistan persons per housing unit were 6.70 and 6.80 percent in 1981 and in 1998 respectively and the number of persons per room was 3.50

and 3.13. On the other hand, it was noticed that 51.54 and 38.11 percent people were living in one room, whereas 44.83 and 30.54 percent, 3.63 and 24.43percent, 6.70 and 6.92 percent people were living in two rooms, three to four rooms and five or more rooms respectively (Table 3 and Table 4).

Table 3

Congestion of Housing Units

Indicators	1981				
	Pakistan	KPK	Punjab	Sindh	Balochistan
Persons per Housing Unit	6.70	7.00	6.50	7.10	7.60
Persons per Room	3.50	3.60	3.30	4.00	4.20
Single Room Housing Units (%)	51.54	50.00	48.00	61.00	60.00
Two Rooms Housing Units (%)	44.83	4.00	48.00	36.00	36.00
3-4 Rooms Housing Units (%)	3.63	46.00	4.00	3.00	4.00
5 and more Rooms Housing Units (%)	6.70	7.00	6.50	7.10	7.60
	1998				
Persons per Housing Unit	6.80	8.00	6.90	6.00	6.70
Persons per Room	3.13	3.34	3.04	3.37	3.07
Single Room Housing Units (%)	38.11	27.71	31.97	56.93	42.77
Two Rooms Housing Units (%)	30.54	34.50	33.54	23.87	25.18
3-4 Rooms Housing Units (%)	24.43	29.11	27.12.	17.00	22.69
5 and more Rooms Housing Units (%)	6.92	8.67	7.36	3.56	9.36

Source: Population Census (1981 and 1998).

Table 4

Congestion of Housing Units

Indicators	2004-05				
	Pakistan	KPK	Punjab	Sindh	Balochistan
Persons per Housing Unit	6.75	7.71	6.55	6.71	6.88
Single Room Housing Units (%)	24.20	18.35	24.75	30.76	14.79
2-4 Rooms Housing Units (%)	68.71	69.90	68.69	65.00	75.78
5 and more Rooms Housing Units (%)	7.09	11.75	6.56	4.24	9.43
	2010-11				
Persons per Housing Unit	6.38	7.17	6.16	6.39	7.08
Single Room Housing Units (%)	24.83	19.03	26.09	25.67	20.89
2-4 Rooms Housing units (%)	69.33	72.62	67.49	70.94	75.02
5 and more Rooms Housing units (%)	5.84	8.32	6.43	3.39	4.09

Source: PSLM (2004-05 and 2010-11).

The gap between supply and demand for housing is persistently rising in Pakistan. The previous section clearly indicates that per annum housing demand is around 0.35 million. The unavailability of new housing unit increases the congestion and homeless people in the country. This calls for governmental intervention to provide decent accommodation to every household. Pakistan had no housing policy at national and even provincial level till 1992. First National Housing Policy was developed in 1992, which was revised in 1994. This policy proposed various innovative methods for increasing housing stock and improving the quality of existing housing units. The government, nevertheless, failed in implementing this policy. Later on, the government of Pakistan had formulated a National Housing Policy (NHP) in 2001.

The NHP 2001 covers all major issues related to housing market, such as land issues, housing finance, construction service sector, low cost rural housing, building material, infrastructure development, zoning regulations and institutional arrangements. The NHP 2001 highlights key challenges to housing sector and proposes some strategies to resolve those issues and challenges and spells out the aims with key objectives. Following are the key problems and issues that were highlighted in the NHP 2001:

(i) The housing related issues are mainly generated by huge population growth.
(ii) The per annum housing requirement is 0.57 million.
(iii) The unchecked growth of squatter settlements, *Katchi Abadis*, encroachment of state and vacant land is held responsible for housing shortages.
(iv) Scarcity of suitable land for housing, particularly in and around the urban centres.
(v) Affordability issues, especially for low-income group.
(vi) The housing stock is rapidly aging.
(vii) Shortage of affordable housing finance to be major obstacle in housing production.
(viii) Tremendous rise in price of housing material because of inflationary pressure.
(ix) Lack of the use of technology.

To overcome these issues and meet the future housing requirements, with low cost and high quality, the proposed NHP 2001 was intended to achieve the following aims and objectives:

(i) To propose an enabling strategy for capacity building and institutional arrangements.
(ii) Empowering all stakeholders, including public as well as private sector for housing market development.
(iii) To propose a strategy for easing housing finance and home improvement credits which are compatible with affordability, especially for low-income group.
(iv) Strategy to improve the housing conditions through development, capacity building and initiation of innovative ideas.
(v) Strategy to upgrade the existing cities with better planning through the improvement of infrastructure.
(vi) Encourage research and development activities to design low cost houses.
(vii) Provision of safeguard against malpractices and resource mobilisation.
(viii) Provision of incentives through tax rationalisation.
(ix) A countrywide program of developing small and medium size towns having growth potential.

3. CONCEPTUAL FRAMEWORK, DATA AND ESTIMATION METHODOLOGY

3.1. Conceptual Framework

To put the above discussion in a framework, we followed the work of Goodman (1998), Zabal (2004) and Fontenla and Gonzalez (2009). These studies have used the utility maximisation approach as a framework to understand the housing demand dynamics. Let individual i's utility function in market j depends on two goods: (i) non-

housing composite consumption, denoted by C_{ij} and (ii) the amount of housing units, denoted by q_{ij}. We also assume that households have the same utility function but differ in their socio-demographic characteristics. These socio-demographic characteristics are denoted by z_i. The vector z includes variables such as age of the head of the household, gender and education, social status and migration. The utility function of the household can be written as follows:

$$U_{ij} = U(C_{ij} \quad q_{ij} \quad z_i) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

Assuming a static setting, the objective of an individual is to maximise the utility, given the budget constraints. An individual chooses how to allocate his/her income to non-housing composite consumption (C_{ij}) and the housing services (q_{ij}). The budget constraint of an individual can be defined as follows:

$$C_{ij} = p_i q_{ij} = m_{ij} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

Where m is the household's income, p is the price of housing services and the price of non-housing consumption is normalised to one. We allow housing prices to be different across markets.

The household's utility maximisation problem is defined as follows:

$$\text{Max}_{C_{ij}, q_{ij}} U(C_{ij} \quad q_{ij} \quad z_i)$$
$$st \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$
$$C_{ij} + p_j q_{ij} = m_{ij}$$

Solving the budget constraint for C_{ij} and substituting into the utility function gives the indirect utility function. The budget constraint can be written as follows:

$$C_{ij} = m_{ij} - p_i q_{ij} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

Now substituting Equation 4 in the utility function, we get the following indirect utility function

$$V_{ij} = \text{Max}_{q_{ij}} U(m_{ij} - p_i q_{ij}, \quad q_{ij}, \quad z_i) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (5)$$

Solving Equation (5) yields the (implicit) housing demand equation

$$p = \frac{\frac{\partial V}{\partial q_i}}{\frac{\partial V}{\partial m_i}} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (6)$$

Providing a specific form for the utility function (1), will give rise to an explicit housing demand equation. While many utility functions result in non-linear demand equations, typically a log-linear housing demand equation is specified

$$\ln q_{ij} = \beta_0 + \beta_1 \ln p + \beta_2 \ln z_i \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (7)$$

This equation can be assumed to be an approximation to the underlying (non-linear) housing demand equation. We analysed the housing demand in Pakistan with the use of this model. Estimating the implicit parameters of Equation (7) is the main purpose. We usually observe the value of the housing unit rather than the quantity. Thus, q_{ij} has to be estimated in order to obtain Equation (7). An important feature of the housing market

is that the physical and surrounding characteristics of the housing units are important, yet they vary widely across the housing units.

Define H_n as the vector that represents housing characteristics for housing unit n. Similarly, β_j is defined as the parameter vector, which is allowed to vary across markets, for each of the housing unit characteristics in H_n. Thus the value v of a housing unit n in market j, consumed by household i, is given by the following expression:

$$V_{nj}^i = V\left(H_n; \beta_j\right) \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (8)$$

If the characteristics H_n and the value $v_{n,j}^i$ of each housing unit are known, then it is possible to estimate β_j, using a hedonic price model. In addition, defining H_n^* as the standard unit we can compute the price index p_j as follows:

$$p_j = \frac{V(H_n^*; \beta_j)}{V(H_n^*; \beta_1)} \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (9)$$

The value of the housing unit n in market j, consumed by the household i can be expressed as $v_{n,j}^i = q_{ij} \cdot p_j$. The quantity, therefore, of housing is obtained as follows:

$$q_{ij} = \frac{v_{nj}^i}{p_j} \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad \cdots \quad (10)$$

Once we know the q_{ij}, we can estimate the Equation 7.

3.2. Data

To estimate the demand for housing, data of various social and economic indicators is taken from Pakistan Social and Living Standards Measurement Survey (PSLM) and Household Integrated Economic Survey (HIES), conducted by Pakistan Bureau of Statistics (PBS). In this study, PSLM survey data for the year 2004-05 and 2010-11 is taken.

We are using a set of population based social indicators for 16341 households from PSLM/HIES national level data. The data on household information covers education, health, employment and income as well as ownership of assets, household details, immunisation, married women, facilities and services. Additionally, it offers data on household consumption expenditures (including consumption on durable items owned/sold), transfer received and paid out and buildings and land owned. Population of all the four provinces is considered as the universal sample. Under the framework of PSLM/HIES each city/town was sub divided into enumeration blocks. Urban areas were divided into 26698 blocks and rural areas comprised of 50588 blocks. Each urban block was categorised on the basis of income groups. The selection of Primary Sample Units (PSU) and Secondary Sample Units (SSUs) data from urban and rural areas of each province has been discussed in Table 5.

Table 5 indicates that the entire sample of households has been drawn from 1045 Primary Sample Units (PSUs) in 2004-05, out of which 486 are urban and 559 are rural and 1180 Primary Sample Units (PSUs) in 2010-11, out of which 564 are urban and 616 are rural. The total sample is 14777 in 2004-05 and 16341 in 2010-11. This sample size has been considered sufficient to produce estimates of key variables at national and provincial levels [Pakistan (2012)].

Table 5

Profile of the Sample of PSLM Survey (2004-05 and 2010-11)

Province/Area	Sample PSUs			Sample SSUs		
	Urban	Rural	Total	Urban	Rural	Total
		2010-11				
Punjab	256	256	512	2935	4019	6954
Sindh	152	144	296	1802	2296	4098
Khyber Pakhtunkhwa	88	120	208	1041	1913	2954
Balochistan	68	96	164	811	1524	2335
Total	564	616	1180	6589	9752	16341
		2004-05				
Punjab	210	226	436	2511	3607	6118
Sindh	125	125	250	1497	1980	3477
Khyber Pakhtunkhwa	91	118	209	1088	1878	2966
Balochistan	60	90	150	713	1434	2147
Total	486	559	1045	5809	8899	14708

Source: PSLM/HIES (2004-05 and 2010-11).

3.3. Estimation Methodology

In this study, we seek to determine the factors that impact the demand for housing and its services across income groups. Additionally, welfare impact across income groups is also determined for 2004-05 and 2010-11, that will clarify whether the housing units owned by the income-based groups are better off or worse off. For the purpose of analysis, this model includes $m = 1 \ldots M$ urban areas. In each urban area there are $i = 1 \ldots I_m$ individual household heads and $j = 1 \ldots J_m$ housing units. The analysis, therefore, considers each city as a separate entity across income groups.

3.3.1. *Housing Demand Model*

The model explained in previous section indicates that various socio-economic variables explain the housing demand. These factors include different physical and community attributes, such as number of rooms, dummy variable for owner occupied or rented unit as well as the availability of housing services, including pipe-water, motors, hand pumps or others. The community attributes include whether a housing unit is located in a city, number of earners and educated members in the household. Moreover, attributes related to head of the household are age, gender, education, marital status, employment status and occupation. In this study, we consider the household head as a special case. Thus demand for housing can be represented as a function of personal characteristic of the household head, background of the household and price of housing. The functional form of housing demand highlighted in Equation 7 at maximum utility level is given below:

$$q(z) = f(X_1, Y, C, p_j(z)) \quad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \quad (11)$$

For each housing characteristic "z_{ij}" the $q(z)$ presents the quantity of individual housing unit, which is to be estimated. X_1 refers to the household characteristics such as family size, income group it belongs to and the number of earners. Income of household is represented by Y which is the sum of permanent income and transitory income.

Characteristics of the head of the household is represented by C, including education of the household head, age of the household head, occupation, marital status and gender. Finally, $p_j(z)$ denotes the price of the individual household which is not available for household data. A proxy, therefore, is used to capture the price of the house estimated, using hedonic price model. In order to estimate the demand for housing, we first need to calculate the quantity of housing unit ($q(z)$), house price ($p_j(z)$), permanent income (Y_P) and transitory income (Y_T). Thus the demand for housing is determined as

$$Y_i = x_i'\beta + e_i \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (12)$$

In Equation (12), Y_i represents the housing quantity and x_i' is a vector with dimensions 1 x M, representing all exogenous variables included in the model. β is a vector of parameters with M x 1 dimensions. The following Ordinary Least Square (OLS) regression equation specifications used for housing demand in log-linear form is given as:

$$q(z) = \beta_0 + \beta_1 lnY_P + \beta_2 lnY_T + \beta_3 \ln\left(p_j(z)\right) + \beta_4 lnA_{R/Y} + \beta_5 lnA + \beta_6 lnE_r +$$
$$\beta_7 lnE_d + \beta_8 lnF_s + \delta_1 ln(male) + \delta_2 lnM + \delta_3 lnY_M + \delta_4 lnY_H +$$
$$\sum_{m=1}^{14} \delta_m Ct + e_i \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (13)$$

Where, β is the coefficient of exogenous variables and δ is the coefficient used for dummies. The interpretation of the variables is as: $q(z)$ is the quantity of housing unit (defined in equation 10), Y_P is the permanent income of the household, Y_T represents the transitory income, $p_j(z)$ is the price of housing unit, $A_{R/Y}$ is the affordability of the individual household head, A is the age of the household head, E_r represents the number of earners in a household, E_d is the education of the household head, F_s is the family size (children and adults), *male* is the dummy, representing the gender of the household head (=1 if male; = 0 if female), M is the marital status (=1 if married; =0 otherwise), Y_M is the dummy for middle-income group (=1 if middle-income group; = 0 otherwise), Y_H is the dummy for high-income group (=1 if high-income group; = 0 otherwise), Ct represents the dummy for the 14 urban cities of Pakistan selected in this study and e_i is the error term. Moreover, all the variables used are in its log form for reducing changes including extreme values in parametric estimation. Additionally, it also reduces the heteroscedasticity in data.

3.3.2. *Housing Quality*

In order to estimate the housing demand, dependent variable i.e. quality of housing units is first calculated following Dusansky and Koc (2007).

$$Standardized\ Housing\ unit\left(q(z)\right) = \frac{(owner-occupied\ housing\ value\,)}{house\ price\ per\ unit\ p_j} \quad \dots \quad (14)$$

The market value of the house is used as a proxy to measure the owner-occupied housing value, which refers to the price of the house acceptable if he wishes to sell his property. The housing price per unit represents the hedonic price $p_j(z)$. Some studies also used rent (rent equivalent) instead of owner-occupied housing value for the calculation of housing units [Hernández and García (2006); Garabato and Sarasola (2011)]. The demanded quantity of housing calculated in Equation (14) is used to calculate the factors that affect housing demand.

3.3.3. *Permanent and Transitory Income*

There are many views regarding the modelling of the unobservable variables, such as permanent income and transitory income. Friedman (1957) states that the consumption is the function of permanent income, but his point of view was criticised as the consumption decision of the household are forward-looking. It was looked at as a poor determinant to measure the permanent income. Though, permanent income cannot be measured directly, it is estimated using physical and human resources, such as education, property and experience, which contribute in generating income. Singh, *et al.* (1986) states that the determinants of permanent income are the household characteristics, physical assets, education, community and environmental attributes. It was, nonetheless, argued that the physical assets are a weak determinant of permanent income, as physical assets may underline a different level of permanent income in different countries. Because of the environmental and economic factors, the price of physical assets is distorted and it represents different proportion of ownerships, thus the level of permanent income. Many different approaches are discussed in literature to measure permanent income, Townsend, *et al.* (1985). Some used qualitative approach while others used rapid rural appraisal (RRA) approach [Takasaki, *et al.* (2000)]. Shefer (1990), Ahmed (1994) and Ballesteros (2001) used the expenditures on consumption as a proxy to measure permanent income.

There are some studies, nevertheless, that used a set of different individual characteristics such as education, age, skills, wages, bonus, pension, on job training capital gain, inheritance and savings [Goodman and Kawai (1984); Ahmed (1994); Wang (1995); Goodman (2002)]. Thus, following Goodman and Kawai (1984) and Goodman (2002), we expressed permanent income as a function of human and non-human wealth:

$$Y_P = f(H, N) \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (15)$$

Where, H is the human wealth and N represents the non-human wealth. The human wealth demands the expected future income such as bonus and increments (annual increase in income on constant rate) and the current income, which depends on the individual household characteristics such as age, education, gender, marital status, occupation, employment status, number of earners in a household and family size. Non-human wealth accounts for the income received from other resources, such as remittances and income from commercial or non- agricultural property.

Thus, the permanent income measure represents the potential lifetime earnings and by regressing the real observed total income on the independent variables, provides the permanent income as fitted value of the regression and transitory income as residual. Observed total income is indicated as the sum of permanent and transitory income is highlighted in Equation (16) as:

$$Y = Y_P(H, N) + Y_T \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \quad (16)$$

Linear regression model is represented as:

$$Y = \beta_0 + \beta_1 lnA + \beta_2 lnE_r + \beta_3 lnE_d + \beta_4 lnF_s + \beta_5 lnR_m + \delta_1 ln(male) + \delta_2 lnM + \delta_3 lnE_P + \delta_4 O_C + \delta_5 lnY_M + \delta_6 lnY_H + \sum_{m=1}^{14} \delta_m Ct + e_i \qquad \dots \quad (17)$$

Where, β is the coefficient of exogenous variables and δ is the coefficient used for dummies. Y represents the observed total income, A is the age of the household head, E_r represents the number of earners in a household, E_d is the education of the household head, F_s is the family size (children and adults), R_m is the remittances, *male* is the dummy representing the gender of the household head (=1 if male; = 0 if female), M is the marital status (=1 if married; = 0 otherwise), E_P is the dummy for employment status (=1 if employed; = 0 otherwise), O_C represents the occupancy: whether the housing unit is owner occupied, rented, subsidised rent or rent free, Y_M is the dummy for middle-income group (=1 if middle-income group; = 0 otherwise), Y_H is the dummy for high-income group (=1 if high-income group; = 0 otherwise), Ct represents the dummy for the cities and e_i is the error term. Thus the predicted income is the required permanent income (Y_P) and the residual is saved as transitory income (Y_T).

Various income measures can be estimated using different sets of explanatory variables, but the best fitted regression model for which the standard error is minimum, is chosen for the analysis.

3.3.4. *House Price*

Since house prices are not available in the data set of PSLM, it is estimated using the hedonic price model. The price of the house is determined by the internal characteristics as well as the external factors. There are other underlying issues that cause difficulties towards calculating the price of unobserved variables. Firstly, price of the property is not the same in each period; the house price varies because of the supply and demand factors that determine the price. Thus, the price is not same for two consecutive periods. Secondly, such as many other products, properties of house traded in market are not identical. The price changes, therefore, because of the characteristics of property (number of rooms, appearance, source of water, availability of gas, electricity, telephone, means of sewage), location attributes (close to market area, office, school, hospital, neighbourhood and others) and environmental attributes (urban, rural, industrial area, air or water pollution) [Herath and Maier (2010)]. Thus, these attributes cannot be ignored while calculating the house price.

The household survey data provides information about the expected value of the house/property, if it is put up for sale and is reported as the owner-occupied housing value. Owner-occupied housing value represents the product of housing price per unit and standardised housing unit. The value of the housing price is extracted from the owner-occupied housing value using hedonic regression. Following Goodman and Kawai (1984) and Goodman (2002), house price per unit can be calculated using hedonic price model, which is a more sophisticated form of mix adjustment. The hedonic regression, in terms of set of features that contributes to the value of house is as follows:

$$lnP = \alpha + \beta_1 lnH_S + \beta_2 lnT_H + \gamma_1 lnW_P + \gamma_2 lnW_{HP} + \gamma_3 lnW_M + \gamma_4 lnG_{AS} +$$
$$\gamma_5 lnTS + \gamma_6 lnTPT + \gamma_7 lnTPS + \gamma_8 lnTMS + \gamma_9 lnTHS + \gamma_{10} lnTHP +$$
$$\delta_3 lnY_M + \delta_4 lnY_H + \sum_{m=1}^{14} \delta_m lnCt + e \qquad \ldots \qquad \ldots \qquad \ldots \quad (18)$$

Where, P is the owner-occupied housing value, number of rooms is used as a proxy to measure the house size and is represented by H_S, T_H is the house tax, W_P is the dummy for piped water (= 1 if piped water; = 0 otherwise), W_{HP} is the dummy for water from hand pump

(= 1 if water from hand pump; = 0 otherwise), W_M represents the dummy for water availability from motor (= 1 if water from motor; = 0 otherwise), G_{AS} is the dummy for availability of gas (= 1 if gas is available; = 0 otherwise), TS denotes the time (in minutes) required to reach a grocery shop, TPT represents the time (in minutes) required to reach a public transport, TPS characterises the time (in minutes) required to reach a primary school, TMS represents the time (in minutes) required to reach a middle school, THS represents the time (in minutes) required to reach a high school, THP symbolises the time (in minutes) required to reach a hospital, Y_M is the dummy for middle-income group (=1 if middle-income group; = 0 otherwise), Y_H is the dummy for high-income group (=1 if high-income group; = 0 otherwise), Ct represents the dummy for the 14 urban cities and e is the error term. β is the coefficient of exogenous variables and δ is the coefficient used for dummies. Taking logs of the variables are considered to ensure that the prices are non-negative. This regression model used values of the above mentioned features to predict the price of housing unit during a particular period. The fitted values generated from the hedonic regression are the required prices per house for the standardised housing units. Dusansky and Koc (2007) are of the view that prices generated from the hedonic method represent the prices of the same sized house across cities. Hedonic price modelling is commonly used in real estate for sales comparison. Thus, allow the comparison between prices of constant quality housing across cities over a particular time period.

3.3.5. *Imputed Rent*

For the calculation of standardised unit of housing, we also need to estimate affordability. In literature, affordability is defined as the ratio of rent to total income [Tiwari and Parikh (1998)]. Housing expense is commonly measured through rent. Malpezzi and Mayo (1985) considered rent as the product of unit price and quantity consumed, depending on the housing services. It varies for individual household, depending on the shelter, type of construction, dwelling and neighbourhood. The conventional hedonic regression model can also be used to measure imputed rent. The hedonic equation for house rent is specified as:

$$R = f(R_T, W_T, G_{AS}, T_F, W) \quad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \qquad \ldots \quad (19)$$

The house rent is measured against the set of characteristics of the housing unit, which are specified as follows: R_T is the type of roof, it may be made of rcc/rbc, wood/bamboo, steel/cement or other; G_{AS} represent the dummy for availability of gas, T_F represents the toilet facility (outdoor, flush, pit/latrine or others), W represents the water availability (piped, hand pump, motor or other) and W_T refers to type of walls i.e. brick, cement, stone, wood, bamboo or mud. After the hedonic regress, fitted value of the imputed rent is generated for the sample of housing units [Malpezzi (2003)]. Imputed rent is used only for owner-occupied housing unit for which only market value of housing is available.

Following Greene (2003) and Wooldridge (2006), we applied Heckman's two-step model [Heckman (1979)] of sample selection. In order to select sample, two equations are used, first is the equation that determines the outcome variable. Second equation only uses selected samples and mechanisms determining the selection process. The dependent variable, standardised housing unit, is only observed for those household heads that are the owners of their houses and are not observed for

those rented units. Regressing an OLS model on the standardised housing unit will cause sensitivity bias. Thus, the model will estimate biased and incontinent value of β. In order to deal with the problem of non-random selection and to control the sensitivity bias between household quantity of service demand and tenure, the Heckman two-step selection model was applied.

For data generation, the Heckman model applies the moments of incidentally reduced by variant normal distribution. The basic Heckman model equation is specified as:

$$z_i^* = w_i\gamma + u_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (20)$$

$$z_i = \begin{cases} 1, & if\ z_i^* > 0 \\ 0, & if\ z_i^* \leq 0 \end{cases}$$

The basic demand equation is

$$y_i = \begin{cases} x_i\beta + \varepsilon_i, & if\ z_i^* > 0 \\ - & if\ z_i^* \leq 0 \end{cases} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (21)$$

z_i^* refer to those households who own their houses and is 0 for rented households. w_i is the 1xk row vector for the selected exogenous variables used in Heckman model and in the demand equation. γ is the parameter to be estimated with kx1 dimensions. As a special case, if the error terms of both equations are correlated then the problem of selectivity arises and additional assumptions are imposed:

$$u_i \sim N(0, 1)$$
$$\varepsilon_i \sim N(0, \sigma^2)$$
$$corr(u_i, \varepsilon_i) = \rho \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (22)$$

Here we assume normal distribution with mean zero and correlationρ. Following Goodman (1988), Ahmad (1994) and Dusansky and Koc (2007) the selectivity biasness was removed through Heckman process.

4. RESULTS AND DISCUSSION

4.1. Housing Demand Analysis

The housing demand was estimated using 2-step Heckman model, whose results are presented below in Tables 6 to 8. The housing demand during 2004-05 indicates that the coefficients of permanent income are insignificant, whereas during 2010-11 the permanent income elasticity of 0.04, negatively yet significantly affected the housing demand. Whereas, the transitory income elasticity 0.033 (2004-05) and 0.039(2010-11) was found to be positive and significant. It was found to be relatively smaller as compared to the income elasticity range i.e. 0.6 to 0.8 found in literature for developing countries [Mayo (1981)]. The results are in line with the findings of Malpezzi and Mayo (1987), Lodhi and Pasha (1991) and Garabato and Sarasola (2011) and they indicate that additional factors are needed to improve the housing demand. The results in Table 5.1, nonetheless, present a static relationship between transitory income and housing demand.

The difference in the results of income elasticity may have stemmed from different income measures [Mayo (1981)]. Ahmad (1994) used the permanent income, predicted from the income regression. Shefer (1990) and Ballesteros (2001) used   monthly

Table 6

Tenure Choice Regression 2004-05 (Income Group Wise)

	Low-income		Middle-income		High-income	
Variables	Coefficient	Margin effect	Coefficient	Margin effect	Coefficient	Margin effect
Permanent Income	13.030	3.246	8.211	2.405	6.450	1.659
	(1.01)***	(0.30)***	(0.53)***	(0.17)***	(0.77)***	(0.22)***
Transitory Income	−0.150	−0.037	−0.244	−0.071	−0.241	−0.062
	(0.18)	(0.05)	(0.10)**	(0.03)**	(0.14)*	(0.04)*
House Price	0.823	0.205	0.962	0.282	1.571	0.404
	(0.33)**	(0.08)**	(0.19)***	(0.05)***	(0.27)***	(0.06)***
Affordability	5.162	1.286	4.087	1.197	2.162	0.556
	(1.53)***	(0.39)***	(1.10)***	(0.32)***	(1.55)	(0.40)
Age	−0.089	−0.022	−0.048	−0.014	−0.034	−0.009
	(0.01)***	(0.00)***	(0.01)***	(0.00)***	(0.01)***	(0.00)***
Number of Earners	−1.180	−0.294	−0.708	−0.207	−0.569	−0.146
	(0.11)***	(0.03)***	(0.06)***	(0.02)***	(0.11)***	(0.03)***
Head's Education	−5.826	−0.893	−3.709	−0.541	−2.993	−0.243
	(0.46)***	(0.03)***	(0.26)***	(0.03)***	(0.46)***	(0.03)***
Household Size	−0.436	−0.109	−0.271	−0.079	−0.293	−0.075
	(0.04)***	(0.01)***	(0.03)***	(0.01)***	(0.05)***	(0.01)***
Gender	1.340	0.468	0.730	0.257	0.832	0.273
	(0.39)***	(0.15)***	(0.22)***	(0.09)***	(0.37)**	(0.14)*
Marital Status	−1.113	−0.168	−0.064	−0.018	−0.702	−0.137
	(0.33)***	(0.03)***	(0.16)	(0.05)	(0.36)**	(0.05)***
Intercept	−152.635		−106.222		−99.540	
	(11.49)***		(6.16)***		(9.58)***	
City Dummies	Yes	Yes	Yes	Yes		
No. of Observations	784	784	1,402	1,402	485	485

Note: *** p<0.01, ** p<0.05, * p<0.1, Figures in parenthesis are robust standard errors.

Table 7

Tenure Choice Regression 2010-2011 (Income Group Wise)

	Low-income		Middle-income		High-income	
Variables	Coefficient	Margin Effect	Coefficient	Margin Effect	Coefficient	Margin Effect
Permanent Income	1.264	0.405	1.391	0.465	3.546	1.142
	(0.47)***	(0.15)***	(0.41)***	(0.14)***	(0.71)***	(0.24)***
Transitory Income	−0.396	−0.127	−0.176	−0.059	−0.206	−0.066
	(0.13)***	(0.04)***	(0.09)**	(0.03)**	(0.12)*	(0.04)*
House Price	1.781	0.570	1.175	0.393	2.113	0.681
	(0.25)***	(0.08)***	(0.17)***	(0.06)***	(0.24)***	(0.07)***
Affordability	0.638	0.204	1.435	0.480	0.730	0.235
	(0.32)**	(0.10)**	(0.28)***	(0.09)***	(0.21)***	(0.07)***
Age	−0.001	−0.000	0.003	0.001	−0.008	−0.002
	(0.01)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Number of Earners	−0.196	−0.063	−0.253	−0.085	−0.475	−0.153
	(0.07)***	(0.02)***	(0.05)***	(0.02)***	(0.10)***	(0.03)***
Head's Education	−0.717	−0.213	−0.888	−0.251	−2.362	−0.340
	(0.24)***	(0.07)***	(0.21)***	(0.05)***	(0.41)***	(0.03)***
Household Size	−0.079	−0.025	−0.016	−0.005	−0.137	−0.044
	(0.03)**	(0.01)**	(0.03)	(0.01)	(0.05)***	(0.02)***
Gender	0.784	0.290	0.474	0.174	0.361	0.126
	(0.26)***	(0.10)***	(0.19)**	(0.07)**	(0.30)	(0.11)
Marital Status	−0.632	−0.166	−0.337	−0.103	−0.415	−0.118
	(0.22)***	(0.05)***	(0.15)**	(0.04)**	(0.27)	(0.07)*
Intercept	−38.854		−33.092		−74.003	
	(5.81)***		(4.85)***		(9.19)***	
City Dummies	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	944	944	1,484	1,484	624	624

Note: *** p<0.01, ** p<0.05, * p<0.1, Figures in parenthesis are robust standard errors.

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Table 8

Housing Demand at National Level (Dependent Variable Housing Units)

Variable	2004–05	2010-11
Permanent Income	0.0190	−0.0430
	(0.0200)	(0.01)***
Transitory Income	0.0330	0.0390
	(0.00)***	(0.00)***
House Price	−0.0270	−0.0420
	(0.00)***	(0.01)***
Affordability	0.1850	0.0080
	(0.02)***	(0.00)***
Age	0.0000	0.0010
	0.0000	(0.00)***
Number of Earners	−0.0010	0.0020
	0.0000	(0.00)***
Head's Education	0.0080	0.0450
	(0.0100)	(0.01)***
Household Size	−0.0010	0.0030
	0.0000	(0.00)***
Gender	−0.0070	−0.0070
	(0.0100)	(0.01)
Marital Status	0.0000	0.0060
	0.0000	(0.00)***
Middle-income Group	0.0030	0.0240
	(0.0100)	(0.01)***
High-income Group	0.0110	0.0840
	(0.0200)	(0.02)***
Lambda	−0.0020	−0.0180
	0.0000	(0.01)*
Intercept	0.9820	2.0370
	(0.23)***	(0.23)***
City Dummies	Yes	Yes
Number of Observations	2752	3,040
R-squared	0.107	0.119

Note: *** p<0.01, ** p<0.05, * p<0.1, Figures in parenthesis are robust standard errors.

household expenditures as an indicator for permanent income. Arimah (1992) and Tiwari and Parikh (1998) used total annual income as a proxy for permanent income. Moreover, because of the difference in the data sample the results uncovered the variations.

The fitted house price was statistically significant and it highlighted a negative relationship between house price and demand for both data sets. It indicated that with an increase in house price, keeping other factors constant, the overall demand in housing

market will decrease. The reported price elasticity ranges 0.027and 0.042 for 2004-05 and 2010-11, respectively. Results suggest that the demand for house price was inelastic. The range of price elasticity observed in literature was from −0.1 to −0.9. The less elastic demand, nonetheless, could be caused by limited supply of houses in markets. Consequently, the household head was bound to pay the asking price of housing. Results imply a downward sloping demand for housing service with no gain in housing demand market.

Rent to income ratio, used as proxy for affordability, derived positive and significant results for the housing demand. With an increase in affordability, which may have been triggered by the increase in income or decrease in rent, the house demand had increased by 18.5 percent and 0.8 percent in 2004-05 and 2010-11, respectively. It implies that household head was willing to buy a housing unit in order to avoid the large housing expense.

All the demographic factors are found to be insignificant for 2004-05, whereas except gender all the demographic factors are statistically significant for 2010-11. Household head's age implies that the need for housing increases with the increase in age. With an additional year in the age of household head, increases the housing demand by 0.1 percent, nonetheless, after a certain age, as the children move out, the demand for housing decreases (2010-11). It also implies that with an increase in house demand because of age, there appears a change in the taste of the individual [Goodman (1988); Fontenla, *et al.* (2009)].

The coefficients for number of earners in a household were also positive and significant. The value of earners coefficient indicates that with an addition of one earning member, the housing demand increased by 0.2 percent (2010-11). Similar results were also reported by studies in Pakistan, such as Pasha and Ghaus (1990) and Nazli and Malik (2003). It shows that a single earner (household head) cannot save enough because of high consumption expenses, therefore, with an increase in number of earning members, the saving level increases, which ultimately increases the demand for housing.

Highly significant results are reported about the effect of education on housing demand. With an additional year in education, the housing demand increased by 4.5 percent, which discovered that the income of the household was in control. Such household could demand a new housing unit with a change in its taste (2010-11). Additionally, with an increase of one member in family, the demand for housing increased, as the number of rooms was already assigned to the existing members of the household. Thus, with an additional member, 0.3 percent increase was recorded. For a household that belonged to middle-income group, the demand increase was recorded as 2.4 percent and for a high-income group, an increase of 8.4 percent in demand was reported (2010-11), as shown in Table (5.3). Mixed results were reported in the previous literature regarding the effect of demographic factors on housing demand.

The LAMBDA coefficient indicates that the choice for housing was made by considering the housing units consumption. The LAMBDA coefficient was positive and significant for only 2010-11. In case of Pakistan, this study established that a major increase in housing demand was caused by the education factor.

4.2. Housing Demand Analysis at Disaggregated Level

This study estimated the housing demand, based on income groups for owned housing and is reported in Table (9). The permanent income elasticity was found positive and significant for low-income group and high-income group, whereas the elasticity for middle-income group was found inelastic (2004-05). The elasticity of 0.06 (low-income group) and 0.07 (high-income group) reported were higher than the results at the national level but it still indicated that the housing demand was inelastic. During 2010-2011, permanent income elasticity (0.04) was negatively significant only for middle-income group. Transitory income represents a positive and significant effect on the housing demand across all income levels and for both data sets. With the increase in income level, the housing demand became less elastic, as high-income group represented an elasticity of 0.02.

Increase in house price negatively affect the housing demand for all income groups. These results are highly significant for low-income groups and the credibility decreases as we move from low-income group to high-income group for both data sets. An increase of 36 percent was observed in housing demand with the increase in affordability in low-income group (2004-05). As we moved from low to high-income group, affordability ratio decreased because of high-income and fixed rent cost and, therefore, housing demand was less affected by the affordability (2004-05, 2010-11). Moreover, during 2010-11 attribute of affordability was insignificant for housing demand.

The coefficient of age of the household head was found to be insignificant during 2004-05, across all income groups. The age factor caused housing demand to change slightly by 0.1 percent for income groups (2010-11). As seen in the results at the national level, age, number or earners, household size (family members), education, gender and marital status are statistically insignificant during 2004-05, except the household size related to high-income group, which negatively and significantly causes house demand to decrease by 0.5 percent.

Increase in the earning members of a household, positively affected the house demand by 0.1 percent (low-income group) and 0.4 percent (middle-income group), nevertheless, for a high-income group, the housing demand decreases by 0.2 percent (2010-11). For middle-income group, the increase in housing demand because of an additional year of education was reported as 5.1 per cent higher as compared to other groups. No significant impact of education, nonetheless, for high-income group was found on the housing demand. For most of the time families living in low-income groups and middle-income groups view housing as an indicator for Social, Economic and Personal Security.

A logical increase in house demand was recorded with the increase in family size for all income groups. Household head, being male, negatively affect the housing demand in low-income group, whereas its effect was statistically insignificant for other income levels. For a married household, the house demand increased by 1.5 percent for a low-income group, while results are insignificant for middle and high-income groups. The results demonstrated a change in the attributes of housing demand across income groups over the year. The housing attributes for low-income groups highlighted that demand was more sensitive to the change. Therefore, high proportion of income was spent on the improvement and consolidation of housing units in low-income group.

Table 9

Housing Demand by Income Group (Dependent Variable Housing Unit)

Variables	2004-05			2010-2011		
	Low-income	Middle-income	High-income	Low-income	Middle-income	High-income
Permanent Income	0.0600	0.0240	0.0780	(0.0240)	−0.049	−0.009
	(0.04)*	(0.0300)	(0.04)*	(0.0200)	(0.02)***	(0.04)
Transitory Income	0.0360	0.0270	0.0280	0.0320	0.042	0.02
	(0.01)***	(0.00)***	(0.01)***	(0.00)***	(0.00)***	(0.00)***
House Price	−0.0450	−0.0270	−0.0100	−0.0410	−0.054	−0.019
	(0.01)***	(0.01)***	(0.0100)	(0.01)***	(0.01)***	(0.01)*
Affordability	0.3620	0.1510	0.2410	0.0040	0.004	0.01
	(0.04)***	(0.04)***	(0.06)***	(0.00)***	(0.00)***	(0.01)
Age	0.0000	0.0000	0.0000	0.0010	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.00)***	(0.00)***	(0.00)***
Number of Earners	−0.0060	−0.0030	0.0010	0.0010	0.004	−0.002
	(0.000)	(0.000)	(0.000)	(0.00)***	(0.00)***	(0.00)***
Head's Education	(0.0090)	0.0050	(0.0200)	0.0310	0.051	0.028
	(0.0200)	(0.0100)	(0.0200)	(0.01)***	(0.01)***	(0.02)
Household Size	−0.0010	0.0000	−0.0050	0.0010	0.002	0.002
	0.0000	0.0000	(0.00)**	(0.00)***	(0.00)**	(0.00)***
Gender	(0.0110)	0.0070	(0.0110)	−0.0210	−0.002	−0.012
	(0.0100)	(0.0100)	(0.0100)	(0.01)**	(0.01)	(0.01)
Marital Status	(0.0040)	(0.0020)	(0.0080)	0.0150	0.002	0.011
	(0.0100)	(0.0100)	(0.0100)	(0.01)*	(0.01)	(0.01)
Lambda	0.0050	(0.0040)	0.0310	(0.0250)	−0.045	0.028
	(0.0100)	(0.0100)	(0.01)**	(0.01)*	(0.01)***	(0.01)**
Intercept	0.6310	0.9640	0.0240	1.8210	2.333	1.307
	(0.4100)	(0.32)***	(0.5800)	(0.32)***	(0.25)***	(0.57)**
City	yes	Yes	yes	yes	Yes	Yes
No. of Observations	784	1402	485	944.0000	1,484	612
R-squared	0.2390	0.0980	0.2640	0.2030	0.16	0.297

Note: *** $p<0.01$, ** $p<0.05$, * $p<0.1$, Figures in parenthesis are robust standard errors.

In an attempt to explain the differences of regional housing demand, this study used the log-linear regression model for a province-wise analysis of houses in urban Pakistan. The results are presented in Table (10). The empirical results suggest that household income was the significant factor, causing housing demand to vary among province. The permanent income elasticity of 0.03 (2004-05) and 0.04 (2010-11) was highly significant and positive for Sindh. Similarly, positive statistically significant and permanent income elasticity was also reported for Punjab (2004-05) and Balochistan (2010-11) on housing demand. Whereas, in case of KPK (2004-05) and Balochistan (2004-05), the housing demand was negatively related to change in permanent income, but the results are insignificant for Balochistan only (2004-05). The results indicate that the demand for housing was inelastic for all provinces.

Transitory income elasticity is positive and statistically significant for four provinces, for both data sets, except for KPK (2010-11). Moreover, the coefficient of transitory income presented inelastic demand for housing across all regions. House price negatively and significantly cause the demand for housing to decrease for all regions except for KPK (2004-05) and Balochistan (2004-05). The result implies that the housing demand was inelastic and relatively small for all regions. The housing price was elastic for Balochistan (2010-11) and was reported to be 0.8. It indicates that the sectorial and

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regional difference should also be considered using aggregate parameters, while estimating housing demands. These differences are not reflected in the housing demand at national level.

Interesting results were reported regarding the affordability of a household head across regions. Results indicated that households in Punjab, Sindh and Balochistan depend on affordability (rent to income ratio) for housing demand but, for KPK results were found insignificant. With an increase in affordability ratio, the housing demand increased by 15 percent and 4 percent for Punjab; 19 percent and 0.4 percent for Sindh and 12 percent and 14 percent for Balochistan for both data sets, respectively. It indicates that individuals depend less on affordability for housing demand. A decrease, therefore, in housing demand was observed over the period for Punjab and Sindh. The dependence on income, nevertheless, for house demand increased over the period for Balochistan.

As discussed in the previous literature, the demographic factors uncovered mixed results. With an increase in age, a significant change in demand was recorded to the extent of Punjab (2010-11) and Balochistan (2004-05). An increase in number of earners negatively and significantly caused the decrease in demand by 0.9 percent for Sindh (2010-2011) and insignificant for all the other regions. With an increase in education, the demand for housing increased by 0.9 percent and 0.1 percent in Punjab; 1.1 percent in Sindh (2010-11) and 5.8 percent for Balochistan (2004-05). Household size negatively affected the demand by 0.3 percent for Sindh (2010-11) and its impact was insignificant for other regions. Similarly, gender and marital status were found irrelevant as a result of regional demand analysis.

Table 10

Housing Demand: A Provincial Comparison (Dependent Variable Housing Unit)

Variables	Punjab		Sindh		KPK		Balochistan	
	2004-05	2010-11	2004-05	2010-11	2004-05	2010-11	2004-05	2010-11
Permanent Income	0.014	0.000	0.038	0.044	-0.047	0.023	-0.035	0.074
	(0.01)*	(0.01)	(0.01)***	(0.01)***	(0.02)**	(0.02)	(0.03)	(0.03)**
Transitory Income	0.025	0.031	0.045	0.047	0.017	0.008	0.033	0.063
	(0.00)***	(0.00)***	(0.00)***	(0.00)***	(0.01)**	(0.01)	(0.01)***	(0.01)***
House Price	-0.021	-0.017	-0.017	-0.011	0.002	-0.030	-0.014	-0.087
	(0.00)***	(0.00)***	(0.01)***	(0.00)**	(0.01)	(0.01)**	(0.02)	(0.01)***
Affordability	0.152	0.044	0.199	0.004	0.071	-0.005	0.124	0.144
	(0.03)***	(0.01)***	(0.05)***	(0.00)*	(0.10)	(0.01)	(0.07)*	(0.04)***
Age	0.000	0.000	-0.000	0.000	0.000	0.000	0.001	0.000
	(0.00)	(0.00)*	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)**	(0.00)
No. of Earners	0.000	-0.000	-0.002	-0.009	-0.001	-0.005	0.003	-0.008
	(0.00)	(0.00)	(0.00)	(0.00)***	(0.00)	(0.00)	(0.01)	(0.01)
Head's Education	0.009	0.014	0.004	0.011	0.023	-0.008	0.058	0.017
	(0.00)*	(0.00)***	(0.01)	(0.01)*	(0.01)	(0.01)	(0.01)***	(0.02)
Household Size	-0.000	0.001	-0.001	-0.003	0.001	0.001	-0.001	-0.001
	(0.00)	(0.00)	(0.00)	(0.00)***	(0.00)	(0.00)	(0.00)	(0.00)
Gender	-0.009	0.001	-0.003	-0.005	-0.011	0.022	0.034	0.061
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.03)	(0.05)
Marital Status	0.003	-0.001	-0.004	0.001	0.016	-0.019	-0.016	-0.016
	(0.01)	(0.00)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)
Intercept	0.988	1.200	0.614	0.636	1.451	1.127	1.394	1.218
	(0.05)***	(0.05)***	(0.07)***	(0.07)***	(0.15)***	(0.18)***	(0.21)***	(0.27)***
No. of Observations	1,385	1,542	971	1,089	234	231	162	178
R-squared	0.066	0.106	0.144	0.247	0.126	0.078	0.263	0.391

Note: *** p<0.01, ** p<0.05, * p<0.1 level of significance and standard errors are highlighted in parentheses.

5. CONCLUSION AND POLICY IMPLICATIONS

The study has attempted to investigate the determinants of housing demand in urban areas of Pakistan. The empirical analysis is carried out using Pakistan Social and Living Standard Measurement (PSLM) survey 2004-05 and 2010-11. The hedonic price model is used for the estimation of house prices. In order to control the selectivity bias between the tenure choice and the quantity of housing services demanded, Heckman's two-step selection procedure is used.

The empirical analysis shows that housing price and income (temporary and permanent) play an important role in the determination of the housing units' demand. An increase in houses' prices causes decrease in demand for the housing units, while the housing demand increases when the permanent income increases. It was found that the transitory income has positive effect on the housing demand among all three groups, but its impact was relatively stronger in case of middle-income. Escalation of price was negatively related to demand, as the housing demand decreases with the increase in the prices of housing units. The affordability has the same effect on low and middle-income groups, but for high-income group it was positive, yet reflects a lesser value in terms of its coefficient. The demand for housing at national level has positively impacted permanent income, as people with more permanent income caused an increase in demand for houses. The scenario changed in 2010-11 when people with more permanent income had a negative impact on the demand for housing.

To manage rising housing demand, following policy implications emerged from the empirical analysis:

(a) Analysis indicates that housing price has a negative impact on housing demand. This finding suggests that government should focus on developing effective and enforced price control mechanism. This will help to control housing market hence reduce burden on city development.

(b) The economic development is one of the major determinants of housing demand, as measured by income. Empirical analysis reveals that rising income has a significant impact on new housing markets. To meet the future demands with rising income, it is suggested that government in collaboration with the private sector should develop new low cost housing societies to cater future needs. Along with the economic development, increasing urbanisation and population growth put pressure on the housing sector. Government of Pakistan should devise national housing policy on priority basis to address future housing demand in the light of Vision 2025. This framework should address not only future demands but also quality issues of housing sector, especially in mega cities.

(c) Affordability is another important policy dimension of the housing sector. The positive association between affordability and housing demand implies that household prefers to purchase new housing unit to manage housing expenses. A well functional rental market may help to reduce housing pressure with innovative housing units. The government should regulate rent market to manage rising demands.

In essence, government should design and implement new housing policy to cater future need. The policy should consider future development, house prices and affordability dimensions in its design. The policy should also look into the institutional arrangement of

this sector to manage rental market and development of new societies, especially in mega cities. The on-going census 2017 will provide a golden opportunity to assess the demand and supply conditions of housing market, in finalising the new housing policy. The Benazir Income Support Programme (BISP) has also collected data on housing condition across Pakistan, using National Socio-Economic Registry (NSER). This data can also be used to understand the current housing situation in Pakistan. A detailed study may be conducted using NSER and PSLM 2014-15 datasets to review and suggest policy framework, keeping in view development, housing price and affordability dimensions.

Appendix

Appendix Table 1

List of Explanatory Variables

Variables	Description
Standardised housing unit	Dependent variable
Permanent Income	Monthly income, remittances or wealth effect
Transitory Income	Unexpected income, bonus
Remittances	Total remittance was the sum of domestic and foreign remittance
Market Value of House	Price of owner occupied housing unit
Low-income Group	Low income group (as identified under PSU)
Middle-income Group	Middle income group (as identified under PSU)
High-income Group	High income group (as identified under PSU)
Affordability	Affordability was defined as Rent to Income Ratio
Household Head's Age	Age of household head in year
Household Head's Education	Education of household head in year
Gender	= 1 if Male; = 0 if female
Marital Status	= 1 if married; = 0 otherwise
Occupation	Post currently working on
Employment Status	= 1 if employed; = 0 otherwise
Industry	Industry in which households head was working
Number of Earners	Number of earners in a house hold
Family Size	Number of members in a house hold
Household size	Number of Rooms
Owner Occupied House	= 1 if owner occupied, = 1 otherwise
Housing Expenditure (rent)	Rent in rupees
Imputed rent	imputed rent was used for the missing values of house rent
Type of roof	It refers to the material used in roof
Type of walls	It refers to the material used in making walls
Water Facility	water availability in house, piped, motor water or other
City	urban cities are chosen for analysis

Source: Author's own work.

Appendix Table 2

Means of Variables (2004-05)

Variables	National	Low-income	Middle-income	High-income
Standardised housing unit	1.00	1.00	1.00	1.00
Permanent Income	11.92	11.56	11.88	12.58
Transitory Income	0.00	0.00	0.00	0.00
Remittances	11026	5089	8808	26069
Market Value of House	1386344	661429	922390	3735204
Affordability	0.85	0.83	0.85	0.87
Household Head's Age	46.24	44.71	45.93	49.43
Household Head's Education	9.84	8.65	9.60	11.63
Gender	0.93	0.95	0.94	0.90
Marital Status	0.89	0.91	0.89	0.87
Number of Earners	1.72	1.84	1.68	1.63
Household size	6.49	6.89	6.48	5.91
Owner Occupied House	0.71	0.69	0.70	0.74
Observation	2752	820	1402	430

Source: Author's own Calculations.

Appendix Table 3

Means of Variables (2010-11)

Variables	National	Low-income	Middle-income	High-income
Standardised Housing Unit	1.00	1.00	1.00	1.00
Permanent Income	12.37	12.08	12.32	12.93
Transitory Income	0.00	0.00	0.00	0.00
Remittances	15712	8320	15381	27683
Market Value of House	2637309	1112030	2033660	6454766
Affordability	0.29	0.27	0.28	0.33
Household Head's Age	47.18	46.04	46.89	49.58
Household Head's Education	10.63	8.72	10.39	13.15
Gender	0.93	0.93	0.93	0.92
Marital Status	0.89	0.89	0.88	0.89
Number of Earners	1.70	1.78	1.73	1.51
Household Size	6.14	6.36	6.14	5.83
Owner Occupied House	0.68	0.70	0.68	0.66
Observation	3053	944	1485	624

Source: Author's own Calculations.

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The Determinants of Services Sector Growth: A Comparative Analysis of Selected Developed and Developing Economies

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This study empirically examines the possible factors that determine the services sector growth, both in selected developed and developing economies. For estimation purpose, the study employs the static as well as the dynamic panel data estimation technique with panel data over the period 1990-2014. The results suggest that GDP per capita, FDI net inflow, trade openness and innovations are the common factors that significantly affect the services sector growth both in developed and in developing economies. However, the productivity gap is the only factor that does not have any significant impact on services sector growth, both in developed and developing economies, which indicates that the Baumol's cost disease has been cured.

Keywords: Services Sector Growth, Panel Data Analysis, Innovations

1. INTRODUCTION

Pioneering work on economic growth points to close association between the variations in the services share and the sectoral composition of the GDP [Fisher (1935); Clark (1940); Fourastié (1949); Baumol (1967, 2001); Fuchs (1968); Hollis and Moises (1975); Kuznets (1966, 1971); Rostow (1971) and Baumol, *et al.* (1989)]. Over the last decade, because of its increasing share in GDP as well as in employment, services sector has attracted the attention of economists around the world. A number of studies have addressed the subject issue from many aspects over different time periods. Many studies foresee that in the years ahead, the services sector will be considered as an engine of economic growth [Young (1995)]. This is justified by the fact that there exists a well-established positive association between the increasing share of GDP, employment and per capita income as well [Fuchs (1981)]. Many studies show that developed countries tend to have a high share of services than that of developing countries. Similarly, it is also evident that as per

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capita income rises, the share of services in GDP rises [Eichengreen and Gupta (2009); Ghani (2010) and ADB (2007)]. It entails a broader role for the services sector in terms of growth, for economies in the future. Moreover, though the share of services sector has grown both in relative as well as in absolute terms, yet the existing internal and external barriers to imports and FDI prevent the services sector from fulfilling its potential. Despite the recent advances, services sector has not been given the due attention by researchers; it has been under-estimated by policy-makers and has been inadequately exploited by many entrepreneurs. The traditional perception of services as unproductive still prevails in the mind of a common man.

The importance of services sector in global perspective is apparent from its rising contribution in output, employment and trade. Services sector constitutes 68 per cent of the world's total output, 39 percent of the world's total employment and 20 percent of the world's total trade. Services sector is characterised as the fastest growing sector, not only in the world's economy as a whole but also in different economic groups. Services share in total GDP is 47 percent in low income countries, 53 percent in middle income countries and more than 70 percent in high income countries [WDI Report (2014)]. The General Agreement on Trade in services [GATS (1999)] was the mainstay for the impetus towards liberalisation of trade and investment in services in the last decade. The services exports reached to $4.7 trillion with a fastest growth rate of 7 percent, compared to 2 percent growth rate of the merchandise exports by 2014. The continuously increasing share of services exports has provided some support to the world trade [WTO Statistics (2014)]. Moreover, the trend of foreign direct investment is in favour of services sector, as this sector received foreign direct investment of $1.3 trillion in 2014 [UNCTAD (2014)]. The trend in growing contribution of services sector to the economy in terms of output and employment, in comparison with other sectors, is still underway in both developed and developing economies. In the last two decades almost all the developed countries have experienced an increase in the growth rate of services sector; however, developing countries have not been benefitted from the same situation. There are some developing countries that have experienced even negative growth rate. Most of the developed economies such as France, Germany, Italy, Japan, Russia, UK and USA have shown an average increase of 7 percent and 2.9 percent for services share to GDP during 1991-2001 and 2001-2011 respectively. As far as the developing economies are concerned, it shows a different picture of services sector performance, as compared to the developed economies. Here, the services share to GDP has increased in case of Bangladesh, Pakistan, Malaysia and Turkey with average rate of 4 percent and 3.7 percent during the period 1991-2001 and 2001-2011 respectively. While in case of Egypt, Indonesia and Iran, the services share to GDP have fallen by an average of 1 percent and 3 percent during 1991-2001 and 2001-2011 respectively [WDI Statistics (2014-15)]. An overview of the selected developed and developing countries is shown in the Table below, which indicates clearly that the share of value added is high in developed countries than that of developing countries. Hence, a separate analysis on determinants of services sector growth both for developed and developing countries is important.

	Services Value-added as % of GDP				
Country	Y2000	Y2014	Country	Y2000	Y2014
Bangladesh	52.9	56.3	France	74.3	78.7
Egypt, Arab Rep.	50.1	49.9	Germany	68.0	69.0
Indonesia	38.5	42.3	Italy	70.0	74.3
Malaysia	43.1	51.2	Russian Federation	55.6	63.7
Iran, Islamic Rep.	50.3	52.4	United Kingdom	72.0	78.4
Turkey	57.4	64.9	United States	75.7	78.0

Source: Uncomtrade data.

The current research paper is organised as follows: section 2 presents a brief theoretical background while section 3 presents a brief explanation of literature review; section 4 focuses on the theoretical and empirical model as well as data collection, variable construction and estimation procedure. Section 5 indicates model estimation and results interpretation, while the last section presents conclusion and policy recommendations.

2. SERVICES SECTOR GROWTH: A THEORETICAL PERSPECTIVES

Fisher (1935) and Clark (1940) , working independently of each other, concluded that the well-known three sector hypothesis identified different factors behind services sector employment and output growth. First they point to the fact that employment will shift from agriculture to manufacturing and from manufacturing to services as long as the economies grow and develop. Second factor that Clark identified to be the driving factor behind the services sector employment and output growth is the tendency of tastes and preferences (demand) to shift towards services due to increase in income. Demand shifts towards services sector, as the demand for manufacturing gets saturated over the course of time that is supposed to make the labour in manufacturing sector move towards the services sector. Third factor that lies behind employment shift and growth of services sector is the differences in productivity between manufacturing and services sector. Clark further justified his argument of employment shift to services sector by the fact that though manufacturing sector is characterised as more productive sector, it is subject to stagnating demand. On the other hand, the service sector which is identified as a low productive sector, yet it is the sector of rising demand. Clark's assumption and propositions were based on empirical data of employment as well as aggregated output and expenditure.

Fourastié (1949), taking forward the argument of shift in demand as well as low productivity rate, while using empirical data, advocated that the 21st century would be the century of services sector employment and growth. In 1966, William J. Baumol and William G. Bowen in their book on the cost disease hypothesis; proposed that income and jobs will increase in sectors which are characterised by low productivity. The rationale for increase in jobs and salaries, despite of no increase in productivity, is seemingly against the classical economics which predicts a close association between rising incomes and high labour productivity. However, Baumol explains if workers are not paid high incomes in low productivity sectors, they will shift towards other sectors where incomes and salaries are high. To keep workers from quitting the existing jobs,

firms in low productivity sectors will pay workers high incomes and salaries, in case of two sectors manufacturing and services sector. Compared to manufacturing sector, services sector is assumed to have low productivity, hence to keep workers moving from services sectors, they will be paid high wages in order to retain them. Hence, this difference in productivity is assumed to cause services sector to grow. To summarise, Baumol presumes that in high income countries, the employment share is high in services sector, combined with low productivity growth. This share of employment tends to grow further with rising income. The Baumol theoretical analysis differs mainly from that of the "classics" by the fact that Baumol assumes that the share of services and goods in real output is constant over time and same across the countries, as implied by his reference to the cross-country study of Summers (1985). In other words, *Baumol* explains the expansion of services sector employment by productivity differential, rising income, as well as by the constant share of services in real output. The basis for rejection of Clark's conjecture of increasing share of services in final expenditure was based on the fact that this share has been almost similar both in developed as well as in developing countries. Klodt (2000) also supported the Baumol presumption of constancy of services share in real output, by using data of FR Germany over the period 1907 to 1990. Klodt concluded that the share of services in real output remained almost the same over the said time period. However in 1985, Baumol himself withdrew from his previous findings and concluded that not all activities in the services are stagnant. Though there are many other factors behind the expansion of services sector growth, the two factors i.e., increasing income and the difference in productivity growth between manufacturing and services sector have been the focus of many theoretical and empirical arguments.

3. EMPIRICAL EVIDENCE

Different studies highlight different indicators as determinants of services sector growth. Many studies consider an increase in income per capita as key determinant for the rising share of services in total output and employment. As income per capita rises, the consumer's final demand shifts from goods to services, because services are considered as more luxurious, more income elastic and more need satisfying than goods [Fisher (1935) and Clark (1940); Bhattacharya and Mitra (1990); Gordan and Gupta (2003); Schettkat and Yocarini (2003); Meglio, *et al.* (2008); Nayyar (2009); Ajmer and Ahmad (2011) and Estrada, *et al.* (2013)]. However, some studies show that though an increase in income per capita shifts the consumer's final demand from goods to services, due to higher income elasticity of services, nevertheless the income elasticity is not so high as exaggerated by the previous empirical studies [Summers (1985); Mahadevan and Kalirajan (2002)]. Many studies in the literature indicate that the gap between manufacturing sector and services sector plays a crucial role in determining services sector growth. These studies show that a less productive services sector requires more labour to cover the total productivity gap. If more labour is employed in services sector, it causes output in services sector to grow in nominal terms rather than in real terms [Ramaswamy and Rowthorn (1993) and Kim (2006)]. However, according to Jack, *et al.* (2002) and Fernandes, *et al.* (2005) because of industrialisation and trade liberalisation induced technological improvement, the services sector productivity has increased while the productivity gap between manufacturing sector and services sector has reduced. The

services sector is now capable of catching up with the manufacturing sector in terms of productivity; hence there is no more significant effect of the productivity gap on services sector growth. Many recent studies have identified an increase in FDI inflow as a contributing factor in services growth. The economy that succeeds in attracting foreign direct investment inflow, will be able to put the economic resources to better use, and will cause productivity and output in services sector to grow [Khaliq and Noy (2007); Irum and Nishat (2009); Chakraborty and Nunnenkamp (2006); Adi, *et al.* (2014)]. However, Sen (2011) suggests that there is one way causality from economic growth towards FDI inflow that is, when economy grows it will be able to attract more FDI from abroad. Recently many studies have pointed out that increase in innovations not only has a positive effect on output and employment but it also has a significantly positive effect on labour productivity in both sectors—services and manufacturing. [Licht, *et al.* (1999); Sapprasert (2006)]. Many studies point to the fact that liberalisation and reforms as well as reduction in trade barriers have contributed to the growth of the services sector [Chanda (2002); Dodzin and Vamvakidis (1999); Gordan and Gupta (2003); Jain and Ninan (2010); Singh and Kaur (2014)]. However, Khoury and Savvides (2006) argue that if foreign consumers have low level of income, they will demand for goods rather than services even if trade barriers are reduced. On the other hand, if foreign consumers have high level of income their demand preferences will shift towards the domestic services, which are considered more luxurious rather than normal goods.

Apart from the above studies, many other studies point to multiple factors as determinants of services sector growth. For example, Acharya and Patel (2015) indicate services sector as one which has the fastest growth and is an important factor that contributes to GDP in India. The study indicates that economic growth, trade and foreign direct investment (FDI) inflows are the main contributing factors in services sector growth in India. In another study related to India, Singh and Kaur (2014) highlight that rapid urbanisation, expansion of the public sector and an increase in demand for intermediate and final consumer services, domestic investments. and openness are considered major determinants for services sector growth. Similarly, Madeira, *et al.* (2014), attributes to increasing investment in acquiring machinery, research and development, more access to new knowledge and increase in marketing activities as the contributing factors to services sector growth.

The empirical literature reviewed so far, indicates that a majority of the existing studies on services sector growth, whether theoretical or descriptive, have examined the experience of a single country or a sample of few countries, like Gordon and Gupta (2003); Singh and Kaur (2014); Jain, *et al.* (2015); Acharya and Patel (2015) have focused on India, similarly, Wu (2007), has focused on India and China, whereas Agostino, *et al.* (2006) has focused on EU countries. However, according to Russo and Schettkat (1999) and also Schettkat (2003), because of diverse development structure of developed and developing countries, the role of the factors such as trade liberalisation, FDI, innovation and difference in productivity may not be the same in developed as well as in developing countries. Hence, it is of key importance to come up with a study that may present a comparative picture for the growth of services sector in both developed as well as developing world. The present study, therefore, is an attempt to study the role of different factors on services sector growth, both in developed and developing countries.

4.1. Empirical Model

Baumol (1967, 1985) presented his well-known "Cost Disease Hypothesis". According to this hypothesis, services share in output and employment rises due to per worker's productivity gap between manufacturing sector and services sector. Services sector rested far behind manufacturing sector in per worker's productivity. To cover the total productivity gap between manufacturing and services sectors, more labour is employed in services sector which causes services share in total output to rise in nominal terms rather than in real terms. Fuch (1980) and Inman (1985) moved the discussion further to factors affecting services sector growth towards the exogenous demand shocks. They empirically suggested that the exogenous demand shocks, such as rural urban migration and female participation in labour force are the main factors behind the rising share of services in output and employment. The current study follows the empirical model developed by Inman (1985). According to Inman (1985), under the prevailing Assumptions[1], output in each of services firm and manufacturing firm is the function of labour employed in that sector only.

$$y_s = f(l_s) \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (1)$$

$$y_m = f(l_m) \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (2)$$

Where y_s represents the growth rate of output in services sector while and y_m indicates the growth rate of output in manufacturing sector. l_s and l_m indicate labour supply both in services sector and manufacturing sector respectively.

The demand for services per labour is the function of relative price of services, wages and exogenous demand shocks.

$$q_s/l_s = c \, (p_s/p_m)^b w^a e^z \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (3)$$

Where q_s represents per worker's demand for services, p_s and p_m are prices of services and manufacturing goods respectively. α and b represent income elasticity of services and price elasticity of services respectively. While z represents the rate of change in demand for services due to exogenous demand shocks.

Services share in total employment is the function of price elasticity of services, demand function of services and the growth rate of labour productivity in services sector.

$$l_s/l = (1/b) \, (q_s/l) e^{-\rho st} \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (4)$$

Here l_s/l represents share of services employment in total employment, the term in the first bracket represents inverse of price elasticity for services, the term in the second bracket is the demand function for services while the last term $-\rho_{st}$ indicates per worker productivity growth rate in services sector.

From profit maximisation condition of competitive market, we can derive relative prices and wages. The equilibrium prices are determined by the ratio of income elasticity and price elasticity (α/b) and the difference between per worker productivity in manufacturing sector and services sector (ρ_m-ρ_s). While equilibrium wages are the

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[1]Labour is the only factor of production. All of the markets in the economy that is labour market, goods market and services market are competitive.

function of price of manufacturing good and marginal productivity of labour in manufacturing sector. i.e.

Equilibrium Prices: $p_s/p_m = (a/b)e^{(\rho m - \rho s)t}$ ...   .   (5)

Equilibrium Wages: $w = \alpha e^{\rho m t} = p_m \, mp_m$ ...   .   (6)

Now putting Equations (5) and (6) into Equation (3) and then substituting the resulting equation into Equation (4) and differentiating with respect to time, we get Equation (7)

$$ls = (\alpha - 1)\rho_m + (\rho_m - \rho_s)(1 + b) + z \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (7)$$

Equation (7) is the main equation[2] which shows that the employment share in services l_s is determined by three factors i.e., income $(\alpha-1)\rho_m$, productivity difference between manufacturing and services sectors $(\rho_m - \rho_s)(1+b)$ and exogenous demand shocks z as well.

Following Inman (1985) we assume that the determinants of services' value added annual growth are the same as that of employment share in services l_s, so we modify the Equation (7) for services' value added annual growth, instead of employment share in services l_s and get Equation (8).

$$y_s = (\alpha - 1)\rho_m + (\rho_m - \rho_s)(1 + b) + z \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (8)$$

The Equation (8) can also be written in simple notation form, i.e.

$$SER = \beta_1 GDPP + \beta_2 PDIF + \beta_3 z \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (8a)$$

SER represents services value added growth which is determined by GDP per capita annual growth (GDPP), per worker productivity difference in two sectors (PDIF) and sum of the exogenous demand shocks (z).

Now in Equation (8)-a, we will insert the other possible variables i.e., Innovation, FDI net inflow and trade openness at a time. Through vector of exogenous demand shocks (z), we can check that whether these factors significantly determine growth in services sector or not.

$$SER = \beta_0 + \beta_1 GDPP + \beta_2 PDIF + \beta_3 INN + \beta_4 FDI + \beta_5 TOP + e_t \quad \dots \quad (8b)$$

Where *GDPP, PDIF, INN, FDI* and *TOP* indicate *GDP* Per Capita, productivity difference (productivity gap), innovation, foreign direct investment and trade openness respectively.

$$SER_{it} = \beta_0 + \beta_1 GDPP_{it} + \beta_2 PDIF_{it} + \beta_3 INN_{it} + \beta_4 FDI_{it} + \beta_5 TOP_{it} + e_{it} \quad \dots \quad (8c)$$

Equation (8)-c is a panel representation of Equation (8)-b as here i in the subscript represents i^{th} cross sections and t in the subscript represents t^{th} time periods. To make the dynamic panel, (8)-c can be written as follows:

$$SER_{it} = SER_{it-1} + \beta_{1it} + \beta_2 GDPP_{it} + \beta_3 PDIF_{it} + \beta_4 INN_{it} + \beta_5 FDI_{it} + \beta_6 TOP_{it} + e_{it} \quad (8d)$$

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[2]The equation provided by Inman (1985) to empirically examine the determinants of growth in employment or output in services sector.

Data and Variables

The current study uses annual growth of services value added as a dependent variable, while GDP per capita growth, innovations, foreign direct investment, productivity difference (productivity gap) and trade openness as an explanatory variables. Data on all of these variables comes from World Bank Development Indicators (2015) for the period 1990-2014.

For comparative analysis of developed and developing economies, the current study has selected seven countries, each from developed as well as developing economies. The sample of selected developed economies includes Italy, Germany, France, Japan, Russia, USA and UK, while the sample of selected developing economies includes Pakistan, Bangladesh, Turkey, Egypt, Iran, Indonesia and Malaysia. Based on the availability of data, few countries have been dropped from the list. Construction of variables is shown in the appendix.

4.2. Estimation Procedure

First, the Equation (8c) is estimated with the static panel data estimation technique that is Pooled OLS model, Random Effect model and Fixed Effect model. Pooled OLS is based on the assumption that there is neither any significant cross section effect nor any notable temporal effect, indicating that all intercept coefficients are the same. Although, the Pooled OLS has simplicity in use but using this model solely may disfigure the picture of the true relationship between the dependent and independent variables. Hence, we move towards Random Effect model and Fixed Effect model as well. The random effect model keeps a common intercept for all the cross sections and follows the assumption of the random unobserved individual components. However; Fixed Effect model allows intercept for each cross section to be significantly different, Gujarati (2003).

Since the economic theory suggests a reverse causality from services sector growth to FDI net inflow, and also a reverse causality from services sector growth towards income per capita. Furthermore, it may be possible that the current study has not considered all the determinants of services sector growth and some of the variables have been omitted which create the omitted variable bias. When the problem of reverse causality and omitted variable bias occur, they both lead to the issue of endogeneity. In case of endogeneity issue, the use of static panel data estimation techniques will lead us towards biased estimation. Hence the results obtained with the static panel data estimation technique cannot be considered for results interpretation, as they are meant to check the robustness of the results only. For the results interpretation, only the dynamic panel data estimation technique shall be considered.

Hence, Equation (8d), the dynamic version of (8c) is appropriate to be estimated with instrumental variable technique that is GMM estimator. The GMM estimation technique presented by Arellano and Bond (1991) is used to examine the effect of lag dependent variable and to treat the issue of endogeneity as well as heteroscedasticity. The selection of valid instruments is necessary to obtain more consistent and efficient estimation result with instrumental variable technique (GMM). The instruments are considered to be valid if it is having correlation with endogenous variables $Cov\ (z, x) \neq 0$

but no correlation with error term Cov $(z, u) = 0$. The current study has used the lags as well as lags of the difference of explanatory variables as the instruments. The validity of instruments has been checked with the Sargen test.

4.3. Data and Variables

The current study uses annual growth of services value, added as a dependent variable, while GDP per capita growth, innovations, foreign direct investment, productivity difference (productivity gap) and trade openness as explanatory variables. Data on all of these variables comes from World Bank Development Indicators (2015), for the period 1990-2014. The current study uses two separate samples of selected developed and selected developing economies. The sample of selected developed economies includes Italy, Germany, France, Japan, Russia, USA and UK while the sample of selected developing economies includes Pakistan, Bangladesh, Turkey, Egypt, Iran, Indonesia and Malaysia.

4.4. Estimation Results

The current study begins to estimate Equation (8c) with static panel data estimation models, which are Pooled OLS, Random Effect and Fixed Effect models. We have used Brush-Pagan Lagrangian Multiplier test to choose between Pooled OLS and Random Effect model. While the selection between Random Effect model and Fixed Effect model is based on Hausman model specification test. The Breusch-Pagan LM test failed to reject the null hypothesis of no random effects in both selected developed and developing economies and suggests pooling the data and estimating the model with Pooled OLS estimation technique. The Hausman specification test could not reject the null hypothesis in case of selected developed economies; however, it rejected it in case of selected developing economies. The Hausman specification test in case of selected developed economies prefer random effect over fixed effect model while in case of selected developing economies it prefers fixed effect over random effect model. As the Breusch-Pagan and Hausman model specification tests do not suggest the same estimation technique for both selected developed and developing economies, so it is better to estimate the Equation (8)-c with all the three static panel data estimation techniques that are, Pooled OLS, random effect model and fixed effect model. The results obtained from Pooled OLS, Random effect and Fixed effect models are nearly the same and are presented in Tables (4.2) and (4.3) for selected developed and developing economies respectively. Though the results obtained with static panel data estimation techniques are according to the theory but as the current model faces the endogeneity issue and we are also interested to see the lag dependent variable's effect; therefore, the current study will mainly focus on the results obtained with the Dynamic panel data estimation technique, that is Difference GMM, which can better explain the current model. The empirical results obtained with Difference GMM are presented in Table 4.2 and Table 4.3 for selected developed and developing economies respectively.

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Table 4.2

Results for Selected Developed Economies

Independent Variables	Static Estimation			Dynamic Estimation
	Pooled OLS	RE	FE	Diff- GMM
SER$_{t-1}$				.0062811
				(0.949)
GDPP	.7708793	.7708793	.7677959	.60684
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
PDIF	−.0006287	−.0006287	−.0014522	.007428
	(0.402)	(0.401)	(0.527)	(0.280)
INN	.0210341	.0210341	.2747879	.4745105
	(0.859)	(0.859)	(0.476)	(0.512)
FDI	.2428669	.2428669	.1388773	.2619307
	(0.002)***	(0.002)***	(0.128)	(0.037)**
TOP	−3.24761	−3.24761	−4.163366	−9.476171
	(0.001)***	(0.001)***	(0.028)**	(0.000)***
Observations	175	175	175	161
R^2	0.6910	0.6910	0.6643	
B-P LM test	0.00			
p- value	(1.0000)			
Hausman test P-value		5.63		
		(0.3440)		
Instruments				27
AR2 test				1.21
p-value				(0.226)
Sargan test				66.56
p-value				(0.13)

Values in the parenthesis are P-values.
***, **, *Represents significance at 1 percent, 5 percent and 10 percent respectively.

The coefficient of GDP Per Capita, estimated with Difference GMM, shows a significant positive effect of increase in income on the services value added annual percentage growth, in both selected developed and developing economies. Since more need satisfying characteristics of services as compared to goods, an increase in GDP per capita will increase consumers' final demand for services rather than goods. The results are in the same lines with other empirical studies, which are Falvey and Gemmel (1996), Moustafa (2002), Nayyar (2009) and Estrada, *et al.* (2013).

The coefficient of productivity difference estimated with Difference GMM has appeared insignificant in case of both samples of selected developed and developing economies. The current study could not find any significant effect of the productivity difference between the manufacturing sector and the services sector, on the growth of services sector. The results indicate that due to technological advancements in advanced countries and the transfer of some of this technology to the developing countries, the services sector productivity has now been raised and the productivity difference between manufacturing sector and services sector has been reduced. Hence, the Baumol's cost

disease has been cured. These results are in the same line with the findings of Meglio, *et al* (2008). However, the current results are against the empirical results obtained by Jack, *et al.* (2002) and Frenandes, *et al.* (2005). The insignificant effect of productivity difference indicates that the services sector does not lag much behind the rest in productivity, Maroto-Sanchez (2010). Only a small category of services has a cost-disease problem leading to low productivity, while the rest of the services sector has shown higher productivity growth, Eichengreen and Gupta (2010). Although, services sector productivity fell after the great slowdown of 1973 but due to advancement in information technology and the increased use of intermediate inputs particularly in fastest growing services industry has over all increased the labour productivity in services sector in the last decade Tripplet and Bosworth (2003). Earlier studies which suggest that the services sector that lagged in respect of productivity were due to conceptual problems, related to the measurement of productivity, which might have made the services sector seem less productive in the past, Griliches (1992, 1994).

The coefficient of FDI net inflow, estimated with Difference GMM, has appeared with significant positive effect on services sector growth in the case of both selected developed and developing economies. The results confirm that an increase in FDI net inflow creates job opportunities by putting the unused resources to use, increase an income per capita and demand for services value added. The previously observed studies Alfaro (2003), Tondl and Fornero (2008), Sirari and Bohra (2011), Singh, *et al.* (2010) and Dixit and Sharma (2014) have suggested the same results. However, the empirical studies of Aykut and Sayek (2004) and Chakraborty and Nunnenkamp (2006) have suggested negative effect of FDI net inflow on services sector growth.

The coefficient of innovation estimated with Difference GMM has appeared with a significant positive effect in case of selected developing economies; however, the coefficient of innovation has appeared insignificant in case of selected developed economies. Results show that as the services firm becomes more innovative, it creates more job opportunities for skilled labour, improves the quality of services, increase income and increase demand for services. These results are in line with Lee, *et al.* (2004), Lopes and Dodinho (2005), Sapprasert (2006), Jaw, *et al.* (2010) and Mitra (2011). The insignificant effect of innovations on services sector growth, in case of selected developed economies could be due to the fact that in post-World War II period, the role of Innovation in economic growth had increased for small economies while decreased for larger economies, Wang (2013). Similarly, the inventions today are only the diffusion of great inventions in the past which does not have any significant effect on growth and standard of living, as they had in the past, Gordon (2012). Furthermore, developing new technology involves high expenses and uncertainties. To have more cost effective innovations, the technologically advanced countries sought innovation opportunities, off-shore in developing countries, which in fact added up to the innovations of developing countries more than the developed countries, Mannig, *et al.* (2012). Another reason for the diminishing role of innovations in developed countries is that, as innovations are associated with negative monopoly rents, the monopoly rent is higher for large size economies and lower for small size economies. The high monopoly rents faced by large economies have decreased the role of innovations in these economies.

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The coefficient of trade openness estimated with Difference GMM, for both selected developed and developing economies, has appeared with significant negative sign. Results suggest that as the degree of trade openness increases, foreign consumers will increase their demand for domestic goods rather than for services. The results are in accordance with previous empirical studies of Dodzin and Vamvakidis (1999) while against the empirical study of El Khoury and Savvides (2006), which suggest a significant positive effect of trade openness on the growth of services sector.

Table 4.3

Results of Selected Developing Economies

Independent Variables	Static Estimation			Dynamic Estimation
	Pooled OLS	RE	FE	Diff- GMM
SER$_{t-1}$				−.1221
				(0.144)
GDPP	.8109663	.8109663	.7694365	.76875
	(0.000)***	(0.000)***	(0.000)***	(0.000)***
PDIF	.0000855	.0000855	.0000963	.0002094
	(0.796)	(0.796)	(0.762)	(0.554)
INN	.5650983	.5650983	1.107889	.8672283
	(0.004)***	(0.003)***	(0.000)***	(0.081)*
FDI	.2032876	.2032876	.2000556	.3142237
	(0.092)*	(0.090)*	(0.088)*	(0.026)**
TOP	.238635	.238635	−7.882495	−7.549656
	(0.618)	(0.617)	(0.000)***	(0.056)**
Observations	175	175	175	161
R^2	0.6177	0.6190	0.1173	
B-P LM test	Chi^2=0.000			
P-value	(1.000)			
Hausman test P-value		Chi^2=21.93		
		(0.0005)***		
Instruments				47
AR2 test				z = 0.90
P-value				(0.368)
Sargan test				chi2 = 51.44
P-value				(0.127)

Values in the parenthesis are P-values.
***, **, * represent significance at 1 percent, 5 percent and 10 percent respectively.

By comparing the empirical results obtained from the samples of both selected developed and developing economies, it is observed that in case of selected developed economies, the three explanatory variables i.e., GDP per capita (GDPP), FDI (FDI) and trade openness (TOP) have shown significant effects on services sector growth. However, the productivity gap between manufacturing and services sector, innovations and lagged dependent variables have not shown any significant effect on services sector growth. Similarly, in case of selected developing economies, four explanatory variables; that are,

GDP per capita (GDPP), FDI (FDI), innovations (INN) and trade openness (TOP) have shown significant effects on the services sector growth, however, the effect of productivity gap and lagged dependent variable are found insignificant in case of selected developing economies. The results obtained for both selected developed and developing economies are nearly same; the only difference is the effect of Innovations, which is significant in case of selected developing economies but insignificant in case of selected developed economies.

The diagnostic tests of Difference GMM are of great importance as they help to confirm the efficiency and stability of the model. The Arrelano—Bond AR_2 test accepts the null hypothesis of "no auto correlation of second order" in case of both selected developed and developing economies. Furthermore, the Sargan test for the validity of the over identifying restrictions, also accepts the null hypothesis of instrument validity, in case of the samples of both selected developed and developing economies.

5. CONCLUSION

On the basis of empirical results, the current study concludes that GDP per capita, FDI and trade openness are some of the possible factors which affect the growth of services sector in selected developed economies. However, in case of selected developing economies these factors are GDP per capita, FDI, Innovations and trade openness. Innovations have significant effect on services sector growth, only in case of selected developing economies, while the productivity gap between manufacturing sector and services sector has no significant effect on the growth of services sector, in both selected developed and developing economies. Moreover, GDP Per Capita, FDI net inflow and Innovations having positive effects, while trade openness has negative effect on the growth of services sector.

The developing countries must focus on the attraction of FDI and promotion of innovations in most of the services sub sectors. FDI inflow will provide them technology, equip their labour with skills and bring new ideas from abroad; while focus on innovation will help them to improve the quality of their services. With more improved and sophisticated techniques of production, they will be able to attract more FDI. The degree of trade openness should be kept at such a level that can increase trade in services without reducing trade in goods. The developing countries can transfer excess labour from agricultural sector to the services sector, which has the potential to absorb the excess labour, without decrease in agricultural productivity. As far as the developed countries are concerned, they share some similarities and dissimilarities with the developing countries. They can attract FDI from abroad and can manage a suitable degree of trade openness but cannot shift the less expensive labour from agricultural sector to the services sector, as that will decrease productivity in agricultural sector. One thing that these developed countries must do is to determine the level of outsourcing their services. Although, the outsourcing provides them with the cost effective production techniques in the short run but in the long run it will be better for them to recover the role of innovations in these countries.

Appendix A1

Variables Included and Their Expected Signs

Dependent Variables: Services Value Added Annual Growth (SER)

S. No.	Variables' Names	Data Used	Expected Sign
01	GDP per capita (GDPP)	GDP per capita growth (annual %)	Positive
02	Productivity gap between manufacturing sector and services sector (PDIF)	$(\frac{annual\ real\ output\ in\ manufacturing\ sector\ as\ a\ whole}{total\ manufacturing\ employment}) - (\frac{annual\ real\ output\ in\ services\ sector\ as\ a\ whole}{total\ services\ employment\ annualy})$	Positive
03	Innovations (INN)	Patents applications filed from abroad + patents applications filed from inside the country	Positive
04	Foreign Direct Investment Inflow (FDI)	Foreign Direct Investment Inflow % of GDPs	Positive/ Negative
05	Trade Openness (TOP)	$\frac{total\ exports + total\ imports}{GDP}$	Positive/ Negative

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Achieving the Shared Economic Growth

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After critically reviewing the literature on the institutional approaches for the shared growth, this paper briefly presents a General Theory of Economic Development (GTED) as basis for the discussion of shared growth. The GTED argues that Economic Discrimination (ED) by Markets, Corporations and Government is a necessary condition for shared economic development while Egalitarianism by any of them is a sufficient condition for economic stagnation. ED means treating the different differently while Egalitarianism is antithesis to ED. This paper also presents a new empirical framework for analysing growth and productivity implied by the GTED, and provides the empirical results that a 1 percent increase of per capita corporate asset brings about a 0.4 percent increase in per capita income and a decrease of income GINI coefficient by 0.015, supporting "the corporate-led shared growth hypothesis" of the GTED. Finally, the paper discusses the dramatic experiences of the rise and fall of Korea's economic development and the stagnated Pakistani experience over the last 60 years, implying that the growth stagnation has been due to the anti-corporate policy led by the egalitarianism.

JEL Classification: B, B5, D21, D23, O1, O43, P14

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I. INTRODUCTION: DILEMMA OF STAGNATION AND POLARISATION

The world economy in the second decade of the 21st century is confronted with the paramount dual challenges of long-term stagnation of economic growth and worsening income distributions (or economic polarisation). At the end of World War II, Western capitalism faced its greatest challenge in the form of global expansion of communism, which vowed to destroy capitalism and replace it with socialism. The communist bloc headed by the Soviet Union promised to create a socialist utopia in which *both* prosperity and complete equality among all citizens would be guaranteed, forever. In order to combat the threat, the Western capitalist nations chose to adopt a revised capitalism (mixed economy) or social democracy, while the developing world chose the balanced growth strategies under social democracy. The socialist world, which

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experimented with a purely socialist economic regime, eventually crumbled in a dramatic fashion with a complete breakup of the communist bloc (North Korea being the sole surviving member). The transitional economies from the old socialist regime are now mostly operating as social democracies. Therefore, one can say that for the whole post-war period, the world economy has been inclined, to a greater or lesser degree, towards egalitarianism, seeking economic equality. But, surprisingly, after two decades of apparent victory in the ideological battle, the Western developed economies today, in particular, find themselves faced with renewed and more intensified struggles over how to address growth stagnation and inequality.

The advent of growth stagnation and economic polarisation runs completely counter to what modern economic institutions and policies had intended and had anticipated; in fact, they were meant and designed to *preclude* such problems. Some critics are quick to place blame on the so-called neoliberal policies since the 1980s.[1] However, if one understands just how short-lived such policies were in place, meaningful only during the Thatcher-Reagan era with some lingering effects, this episode should be seen as no more than a typhoon in a teacup. A broader and proper picture of the underlying institutions, governing the post-war political economy regime, should be seen as the economic equality-seeking "egalitarian democracy," which includes the revised capitalism and social democracy, not to mention socialism. Such broader perspective reveals the ultimate irony of history, that the well-intentioned and concerted efforts to create a more equitable society—i.e. a shared growth economy—have, in fact, produced a more unequal as well as growth-stagnated economies. This historical irony underlies the fundamental dilemma faced by the world economies today and calls for a revitalised search for solutions by economists as well as other social scientists.

Some Marxists or leftist economists cling to the notion that the problem of stagnant growth and worsening income inequality is simply the fact of the capitalist economy, i.e., an inevitable outcome due to the fundamental contradictions of capitalism. Their simplistic "solution" is to further strengthen redistribution. What they fail to recognise is that the policy of redistribution has been the *central* tenet of egalitarian economic policy regimes, adopted by the egalitarian democracies in the post-War era.

On this score, however, the mainstream camp fares no better. They are often heard, stating the current dilemma as being "a new normal" that will sustain for some time, which is another way of admitting ignorance of what is happening and what the solutions are.[2] In fact this confession is partly understandable, since the mainstream has all along been the chief architect or administrators of the political economy regime in the post-WWII era.

The theme of this paper, *how to achieve shared growth,* is directly related to this issue. The world under the egalitarian political-economy regime has been seeking the shared growth models during the post-war period, as a response to the threat of communism. Development economics has also preached balanced growth as the key goal of economic development. These efforts have, ironically, resulted in a world of the polarised stagnation, raising the essential question: what exactly went wrong with

[1] See Piketty (2014) and Stiglitz (2012), for example.
[2] See Summers (2013, 2014 and 2016), Krugman (2013), El-Erian (2010), Cowen (2011) and Gordon (2016) for the issues of growth stagnation and new normal.

economists' toolkit for the shared growth model? While the theme of the shared growth has always been the raison d'être for economics as an academic subject; the economics profession has been failing to deliver the right answers till now.

The order of presentation of this paper is as follows: Section II will briefly but critically review the literature on the approaches to shared growth. Section III will briefly present a General Theory of Economic Development (GTED) as the basis for the discussion of the shared growth model. Section IV will present a new empirical framework for analysing growth and productivity, implied by the GTED and will provide some empirical evidence to support the GTED as well as the shared growth hypothesis of capitalism. Section V will highlight the dramatic experiences of Korea's shared growth during its Developmental State period, followed by the polarised stagnation in recent decades. This section will also compare the Korean and Pakistani experiences over the last 60 years and attempt to explain why they turn out to have once been so different but are getting so similar now. Section VI will conclude the paper.

II. BRIEF OVERVIEW OF THE EXISTING ARGUMENTS

This section will briefly review some of the attempts in the existing literature on economic institutions and policies, designed to create shared growth and development.

In his seminal work, Douglass North (1990) has argued that Private Property Rights (PPR) and Economic Freedom (EF) are the prerequisite economic institutions for economic development, and the new institutional economics (NIE) school has been following suit. However, their development-friendly institutions are, in many cases, not well-defined and sometimes are obscure because even PPR and economic freedom have not been enough to generate development in many cases. While the argument "institutions do matter" is certainly agreeable, the literature has largely failed to provide a clear answer to the question, *"which or what* institutions really matter for development?" However, the NIE arguments are now so very well received that the so-called Washington consensus had already incorporated them into their shopping list of "new" economic development policies.

It should be noted that now the Washington consensus on economic development policy derives from a combination of mainstream neoclassical approaches, neo-liberalism and NIE. They suggest that the free market supported by the socio-economic institutions and policies of PPR, EF, privatisation, deregulation, education, R&D, the rule of law, SOC, free trade and macroeconomic stability will ultimately lead to economic development. This approach rightly emphasises the importance of free market but does not fully take account of the roles of government as well as private corporations (to be discussed shortly). As a result, the mainstream consensus is insufficient in explaining the diverse developmental experiences throughout the history. Nor does this approach sufficiently explains the current problems of the world economy, namely growth stagnation and polarisation, which have emerged even under the most up to date free market system as well as full-dressed democracy.

More recently, Acemoglu and Robinson (2012) stand out as a strand of NIE that proposes the concepts of inclusive institutions as development-friendly institutions, contrasting it to extractive institutions which are detrimental to development. They define extractive institutions as nondemocratic and exploitative institutions, confirming

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the common sense understanding, while defining the inclusive institutions as democratic institutions with PPR and economic freedom along the usual case made by the new institutional economics. Interestingly, their inclusive institutions include the most popular political regime today, i.e. a plural democracy including even social democracy, seeking economic equalities. Their argument, however, fails to explain why then most of the democratic market economies are now facing problems of non-inclusive growth stagnation, after their long effort towards inclusive growth in the post-war era.

Finally, as discussed already, the most popular and dominant political regime today takes the form of "egalitarian democracy", which includes social democracy as well as welfare state under the revised capitalism, and which all seek economic equality. However, as already argued, the egalitarian democracy has, in fact, failed to produce shared growth.

The most serious weakness of all these approaches turns out to be their ignorance of the vulnerability of economic institutions and policies to economic equality ideology that forms the very basis of egalitarian democracy and not much different from the socialist ideology. They do not seem to recognise the danger that seeking economic equality under the egalitarian democracy can actually cause damage to the economic growth and development.

III. A GENERAL THEORY OF ECONOMIC DEVELOPMENT (GTED): A BRIEF SUMMARY

(1) Economic Discrimination (ED) as the Basis of Development

A GTED [Jwa (2017)] consolidates the existing debates on the role of the market vs. the government, by incorporating the role of private corporations and going beyond the neoclassical growth accounting approach. GTED accepts the complexity-view of economic development [Beinhocker (2006)] by interpreting the development as a non-linear order transformation process from a wagon-economy to railway, to the automobile, to the airplane, to spaceship economy, rather than the linear process from a wagon- to more-wagons-economy as in the neoclassical growth model. Seen from this perspective, economic development can be defined as an order or complexity-transformational process, entailing the qualitative as well as the quantitative change, while economic growth is seen as the quantitative change given the order or complexity of economy. However, this paper will use development and growth interchangeably; both implying the order as well as the quantity increases for the sake of convenience in light of the mainstream convention that growth now means both.

GTED starts with a new interpretation of the function of the markets, and highlights the previously neglected role of modern capitalist corporations as the key feature of capitalist economy and the new positive role of the government in economic development, thereby discovering the holy trinity of economic development, markets, corporations and the government. The key organising concept of GTED is "Economic Discrimination(ED)" based on performance. GTED argues that ED by Markets, Corporations and Government is a necessary condition for economic development while Egalitarianism imposed on any of them will be a sufficient condition for economic stagnation. ED means treating the different differently while Egalitarianism is an anti-

thesis to ED. This ED concept is already well established as "dispensation of justice", both in the West and in the East. The Western maxim states that "God Helps those who help themselves", probably reflecting the analogy of the Three Servants in Matthew 25 of the Bible. The parallel Eastern maxim is, "Never fail to reward a merit or let a fault go unpunished" ("信賞必罰" in Chinese and "신상필벌" in Korean)[3], stated 2200 years ago by Chinese philosophers known as the School of Law or the Legalism. ED has been a fact of life all along throughout the history of human evolution. It is critically important to stress, however, that ED does not mean anything like political or social discrimination. GTED incorporates ED mechanism as the key principle of economic development. A short overview of GTED is in order.

(2) Role of Market, Nature and Failure of Development

First, the function of markets is redefined in GTED. Markets in the real world, different from the perfectly competitive markets in the textbook, discriminate economic agents according to their economic achievements and direct resources and wealth to successful agents, a matter of fact in everyday life. Consumers, bankers, financial investors, corporate firms and workers, all endeavour to select the best or better performing agents for their respective economic activities via market transactions, thereby helping only those who help themselves.

Markets thereby create economic inequalities naturally and motivate market participants to work harder. In this sense, markets are a motivational discriminator just like a god who helps those who help themselves. This economic discrimination and motivational function is, in fact, the essential role of markets that make them an important institution for economic development. In this view, any mechanism strengthening the market's discrimination function, by acknowledging differences in economic outcomes and thereby providing motivation, will necessarily help promote economic development. On the other hand, if the markets are artificially constrained not to exercise ED, for example by the egalitarian institutions, they will be helpless in motivating economic growth and development.

Seen from this perspective, PPR system and economic freedom, in fact, can be reinterpreted as a means for creating economic differences and inequalities, which in turn motivate economic agents to work harder, ultimately benefitting economic development. In this regard, the capitalist market economy with unfettered PPR and economic freedom may have more chances to grow. However, as will be seen shortly, markets alone may not be enough for economic development in reality.

Second, development is a complex, cultural evolutionary process of free-replication of or free-riding on others' success knowhow, allowing a mass of people to become successful. This is the very nature of non-linear order transformation process of development. Markets, however, cannot handle such free-riding problem successfully, especially because market transactions face transaction costs. Market transaction is based on the voluntary agreement on the terms of trade of the commodities. Transaction costs naturally arise in reaching an agreement due to imperfect information regarding the nature of commodities and the enforceability of the trading contracts. If such transaction

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[3] "Reward a merit but punish a demerit". Korean as well as Chinese has the same meaning.

costs are too high due to the elusive nature of the commodities, they will become subject to free-riding and turn into free goods and eventually disappear from the market.

Success knowhow is a case in point here. Business leaders that serve as sources of success knowhow but at the same time are subject to free-riding on their services tend to disappear from the market. Markets alone cannot produce the critical mass of economically successful role models to lead the transformation process. This is a case of failure of ED and motivation, a new kind of market failure which is different from the textbook case. Markets alone cannot spark the developmental process, theoretically and historically, as vividly exhibited by the long history of economic stagnation during the agrarian era as well as the modern day catch-up failure by many under-developed market economies.

Here, the introduction of a secure PPR system may help improve the market's power of discrimination, but it is not enough to solve the aforementioned free-riding problem. The reason is that the nature of knowhow success is intrinsically too elusive to be fully identified for legal protection so that it may become prohibitively costly to fully assign and enforce PPR for it. In that sense, a market economy is destined to be trapped in developmental failure.

(3) Role of Corporation Leading The "Capitalist Corporate Economy"

The natural solution to this developmental failure is the expanded participation of private firm, as an organisation based on a command-control mechanism that can avoid transaction costs (or save information costs) and solve the particular market failure by internalising knowhow-free-riding activities at the expense of some organisational costs. The firm comes into existence to take advantage of the markets' failure of ED and turn itself into an expert in ED. In particular, the modern joint-stock corporation is a relatively new social technology that arose in the capitalist economy. It emerged from individually or family owned black-smith-type firms in the agrarian economy to become complex organisations that are capable of expanding their capital base and undertaking business risks to unlimited scales.

Theoretically, the market failure of economic development during the long history of the agrarian economy could be due to the lack of such complex organisations. The natural follow-up question should then be why many capitalist economies around the world are failing in catch-up even with the prevalence of modern corporate system as well as the market economy. The clue to an answer lies in the very nature of development: free-riding on the shoulders of the giants. In a purely private, imperfectly competitive marketplace, successful corporations are also destined to be subject to the free-riding on their success-knowledge by followers and the market will fail to produce such successful corporations in large numbers.

In this context the modern developmental state as a public organisation has been an important supplement to the market, by promoting the growth of such corporations (a key point to be elaborated in the following section). Here, we find the positive role for the government as well as corporation in promoting economic development. With the corporate-promotion role of the government, the modern corporations have eventually become the key supplement to the market in the capitalist economy during and since the industrial revolution. Private joint-stock companies first appeared in Europe in the mid-

17th century, and were formally legalised in England by the early 19th century after a century-long dark age (under the bubble Act during the 18th century) [Micklethwait and Wooldridge (2003)]. By the 19th century private corporations grew to be the key locomotive agent of the industrial revolution as well as of the development of capitalism. The visible hand of modern corporations supplemented the invisible hand of the markets.[4] Seen from this perspective, without corporations and their growth, an economy is destined to remain or move back to being agrarian, as seen in the case of the least developed economies but more tellingly, in the failed socialist economies that abolished their modern corporate system and ended up near-agrarian economies. One can say that today the corporate sector in a capitalist economy has replaced land in an agrarian economy as a fundamental entity that ensures the survival of humans.

The role of modern corporations in helping achieve shared growth of capitalist economies can be seen in Figures 1 and 2 and be confirmed by empirical analysis in the next section. In this vein, the capitalist economy should have been named as "corporate economy," not "market economy." Note that the joint-stock company is a unique social technology that exists only in capitalist economies, while market exchanges have been ubiquitous since the hunter-gatherer era. The modern corporation should not be regarded anymore as an evil giant responsible for creating economic inequalities, as argued by Karl Marx or other critics of capitalism.

Fig. 1. Corporate-led Growth

Per capita GDP ($ thousands) vs Per capita corporate assets ($ thousands)
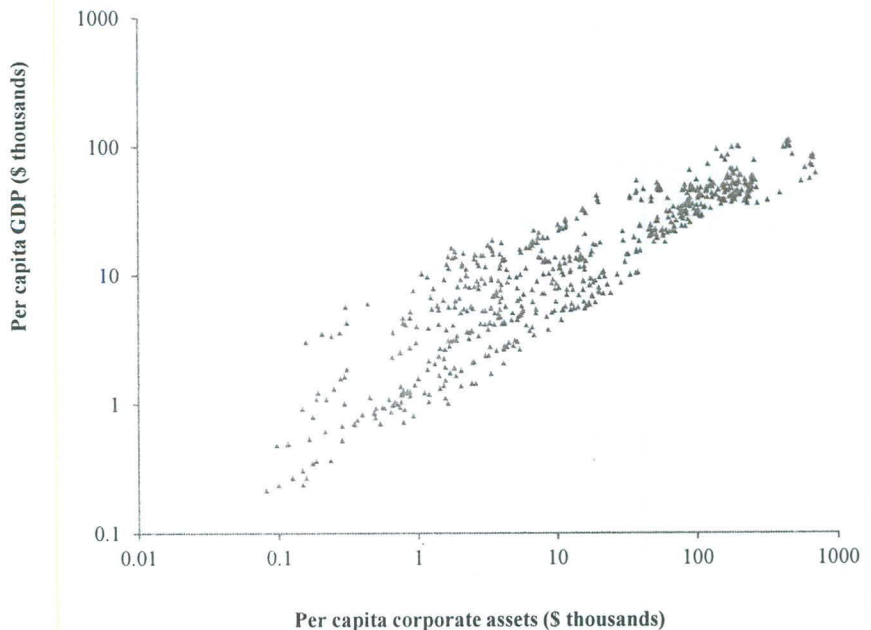
Note: Pooled data for 71 countries over 2005 to 2013. *Source:* S&P Capital IQ & World Bank.

[4] See Chandler (1977) for a similar argument.

Fig. 2. Corporate-led Shared Growth
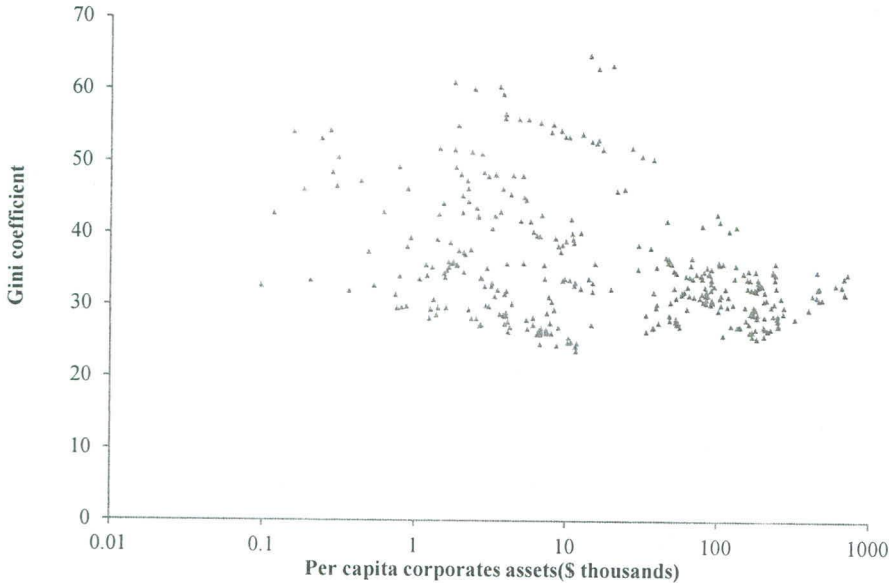
Note: Pooled data for 66 countries for the unbalanced periods over 2005 to 2013. *Source:* S&P Capital IQ and World Bank

(4) Role of Government for Economic Development

GTED reinterprets markets as motivational economic discriminator which can be the logical basis for the role of government in pursuing economic development. The government should help correct the market failure by introducing socio-economic institutions that can help those individuals and corporations who help themselves but are subject to the free-riding by replicators and not fully rewarded. The market institutions should be upgraded and reinforced to fully match the rewards to the performances. A renewed enforcement of market ED-function should be the key role of the government for development. This new interpretation of the role of the government is diametrically opposed to today's most popular paradigm of an egalitarian political economy regime, seeking economic equalities as the prime goal of government policy. It also differs from the mainstream market-centric economics that opposes active government involvement in markets.

The new interpretation of markets as ED mechanism suggests some important new insights into government industrial policies (IP). Specifically the market can be interpreted as exercising an IP everyday, by picking better performers and channelling more resources to them, albeit imperfectly. In this regard, successful government IP should supplement and reinforce the market's ED function, i.e. the market-led IP by helping those individuals and corporations who help themselves rather than neglecting or working against them. The government's IP should pick the market winners *ex post* after the market outcome, rather than pick the winners *ex ante* before the market outcome, which can help avoid the difficult question of how to pick the winners *ex ante*, as in the traditional debates. IP can now be re-interpreted as an ED and motivational mechanism, based on the *ex post* market performance.

From this perspective it is interesting to see that Japanese and Korean industrial policies were successful, precisely because both were implemented in an economically highly discriminatory manner so as to re-enforce market discrimination and motivational function. In particular, their IP always helped those *corporations* that helped themselves, based on their market performances. In this sense, industrial policy can be renamed as discriminatory "corporate promotion policy," which helps correct the market's developmental failure. By this corporate-promotional IP, designed to overcome the success-knowhow free-riding problem, corporations can grow to serve as a locomotive for shared economic development (as shown in Figures 1 and 2).

GTED now argues that the capitalist economy is a "corporate economy" in which the government-led corporate-promotional policy can play a critical role for shared growth. The question may then be how to promote corporations in practice. Governments can select a specific industry, old or new, for promotion, learning from successful precedents or new research; keeping in mind that the implementation of those policies can be successful only by "corporate promotion policy, based on the ED principle", i.e., selecting and supporting corporations based on the market performances.

The ED principle expounded here must not be confused with any protective government interventions against the market competition. The ED corporate promotion policy is a means to activate the competitive rivalry and to motivate growth and development by mimicking the market's ED function. Some lessons can be learned from the actual experience of successful corporate promotion policy of the Korean government as follows:

(i) SME promotion policy supported the better performing firms with more financial as well as tax benefits according to their performance, and they were given the choice to take over the poorly performing firms.

(ii) Better performing exporters were given more financial support and tax benefits and were guided to take over lower performing exporters.[5]

(iii) Privatisation policy always allowed the better performing corporations to take over the SOEs based on the ED principle without political consideration.

(iv) In the process of so-called industrial restructuring, insolvent firms were always to be allowed to be taken over by the solvent, competitive firms which are given some incentives by the government if it is necessary to speed up the process.

(v) Any corporate policy for economic development kept to the ED principle.

There may arise some concern about the potential danger of conglomeration and the resulting monopoly power by the adoption of ED principle. This issue has always been on the table for economic policy discussion but without a successful solution. Demsetz (1974), and Alchian and Allen (1977) argue that monopoly results either from government protection or efficiency: The same applies to conglomeration. It should be remembered, however, that any monopolisation and/or conglomeration of corporations

[5]Accurate actual market performance evaluation is the key for the success of ED export support policies. If it is necessary to amplify ED-support system further, one can introduce "a nation-wide export contest", which selects and recognises the best and better exporters based on their actual export performances and thereby publicises them to be widely known to banks and financial markets, which are always looking for them for support.

emerging from ED corporate-promotion policy amounts to efficiency-driven cases. If those are driven by efficiency, then the solution can be rationally devised, otherwise the government protection should be removed. In the efficiency-driven case, care should be taken not to confuse "ability" with "incentives" to abuse [Alchian and Allen (1977)]. Ability does not necessarily imply incentive. The threat of market power can be tackled by stronger competitive pressure of potential as well as actual rivals. It is good to open the market not only to domestic competitors but also to foreign competitors to check the incentives to abuse. Even if the direct regulation, as an alternative, may have popular political appeal, it is not advised to resort to such direct regulation on the growth of corporations, as used to be the case for many economies including Korea now. This policy has a serious danger to kill the very incentive to grow on the part of corporate sector which in turn harms shared growth. The policy should concentrate on minimising incentives to abuse, by bringing actual as well as potential competitive threat as much as possible; while the incentive to grow should be maintained as high as possible by allowing more freedom for entry. The key success element for both policies lies in the ED principle.

The ED feature of successful government policies is confined not only to cases of successful IP, but is generally applicable to most cases of economic or public policies. Successful economic policies turn out to be economically discriminatory while failed policies are egalitarian, disregarding difference in performance. This is against the popular egalitarian argument that the government should intervene against market outcomes in order to correct the economic imbalances created by the market economy. In this case, markets will respond by simply standing still, resulting in stagnation and no-development.

(5) Ideology and Politics in Development

Ideology or mind set is one of the key informal institutions constraining economic behavior and performance. In this regard, the most important development-friendly ideology should be based on the principles of "can-do spirit" or "self-help spirit" be embodied into the peoples' mind set in order to promote shared growth and development. According to the Korean experience, the condition that the economic discriminatory policy regime should be repeatedly enforced has been imperative in addition to simple education and/or propaganda. Korea's "can-do spirit" during its economic take-off turns out to have been created by the repeated application of government's discriminatory economic policies designed to help only those who help themselves. They include the Saemaul Undong (new village movement), export-promotion policies, and industrial policy for heavy and chemical industry promotion (HCI drive). Note that *a shared growth can only be achievable if people's mindset is shifted toward a development-friendly self-help spirit. Such mindset transformation, in turn, can only be made possible by maintaining the ED policies for a sustained period.*

Politics becomes critical in this regard. Political parties translate the informal institutions of prevailing political ideology into the formal institutions that constrain economic behaviour and performance as the main incentive structure of the society. Therefore, politics as a framer of economic policy regime in a democratic political system should be ready to accommodate the principle of ED lest the law and regulations

go against the principle. Politics as well as the government as a whole should support ED principles that are development-friendly. They should be wary of the egalitarian trap, while equality before the law should be fully guaranteed. Many governments around the world has been emphasising equality of opportunity, but it should be kept in mind that economic opportunity is not a free good to be handed out by the government but an economic good that can only be obtained by hard working agents. In this sense, the government can only guarantee equality before the law rather than the equality of opportunities.

The GTED warns against the socialist economy, egalitarianism, egalitarian democracy, social democracy, revised capitalism and even welfare state, all of which seek economic equality, whatever their political vision or ideology may be. These regimes all work against the market's economic discrimination function and therefore against economic development with shared growth. *Growth for all with unequal results is the only feasible goal for a capitalist economy.*

(6) Holy Trinity of Economic Development, Markets, Corporations and Government

Let me now consolidate the arguments so far. Discriminatory economic institutions, embodying the principle of treating economic differences differently, i.e. ED paradigm and respecting the ideology of helping those who help themselves, immensely benefit development, while egalitarian institutions that treat economic differences equally, especially by disregarding economic excellence, will hinder economic prosperity. Markets with PPR system and economic freedom may be good for the survival of the economy, but they need to be supplemented with economic discrimination by the government and private organisations, if there could be any chance for genuine economic take-off and catch-up in the development game. I have been arguing that *ED is a necessary condition for economic development, while economic egalitarianism is a sufficient condition for economic stagnation.*[6]

Figure 3 summarises the general theory of economic development in which the holy trinity of economic development, markets, corporations and government should altogether keep to the principle of ED to be development-friendly. It should be remembered that ED paradigm has been the central basis not only for the post-war success of Korea under Park Chung Hee. It has also been so for China under Deng Xiao Ping, Singapore under Lee Kwan Yew, Malaysia under Mahathir and Taiwan in 60s-70s. As a matter of fact, the ED paradigm had been at the heart of the industrial revolution of the now developed economies as well as all successful civilisations throughout the history. Furthermore, the ED paradigm has always been the key success factor for corporate management. Now, the ED paradigm which was born even longer than 2000 years ago is being reborn in recent years with the behavioural economics and experimental economics [Gneezy and List (2013)] as well as with management science [Welch (2005)]. Egalitarianism, disregarding the excellence in social as well as economic performance can never be useful for the prosperity of any society. One should not forget the memory of the demise of socialist economies which was exactly due to the lack of ED paradigm.

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[6] See Jwa (2017) and Jwa and Yoon (2004a).

Fig. 3. Holy Trinity of Economic Development
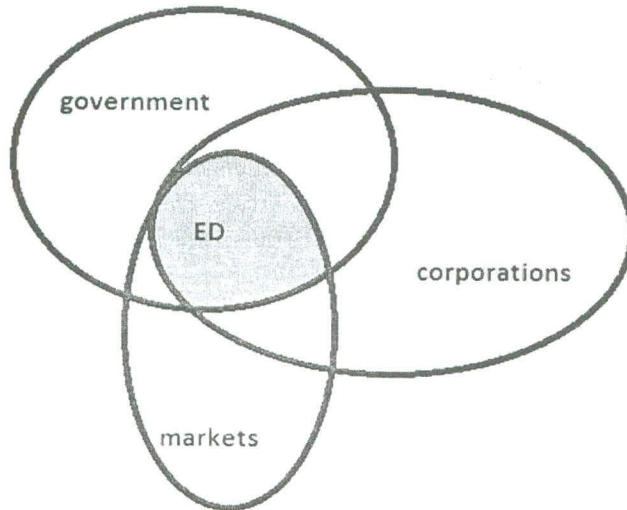
Source: Jwa (2017).

(7) Implications of GTED on Public Policies in General

In general, there can be two different kinds of public policies: economic development policy and social (empowerment) policy. So far in economic policy discussion, there has been little concern over the different nature of the two policies, except for the common-sense understanding that the former creates value-added, while the latter just helps low-income people or the under-privileged to survive or sustain even without new value creation. Today, however, it seems that economic policies as well as social policies have all degenerated into egalitarian (support) policies without any incentive differentiation, depending on the responses, positive or negative, by the recipients, i.e., ED mechanism. As a result, both policies have been unfriendly to growth and development and unsustainable as they lack an incentive scheme to create new value-added or growth, which in turn hurts the soundness of the state's public finance.

GTED strongly implies that economic policies should recover their fundamental nature of ED support principle in order to genuinely spur economic development, while social policies should also be reformed to be based on the ED principle if they are to be self-sustainable by creating new value-added. Therefore, public policy in general should adopt ED principle. In this new framework, not only economic but also social policies would contribute to growth and development, and both will become financially sustainable. It should be recognised that this new ED-based social policy framework will greatly help improve its own financial sustainability, compared to traditional incentive-lacking social policies.

(8) Implications of GTED on Global Economic Dilemma

In the post-war era, balanced development ideology has been leading the egalitarian policy paradigm. Redistributive welfare policies and social empowerment policies have been egalitarian, lacking the ED principle so that the incentive to grow has

been discouraged while moral hazard has been encouraged. As a result, the sustainability of the egalitarian policies has been greatly damaged, ending up with financial difficulties for the States.

Without incentive to grow under the egalitarian policy paradigm, the overall corporate growth will slow down, which will in turn cause growth stagnation and less job creation, leading to a dwindling middle-income class and the rise of so-called economic polarisation. Note that the middle-income class is the product of "capitalist corporate economy" and simply did not exist in the agrarian economy under the Malthusian trap, that was not aided by modern corporate firms. In other words, the fate of the middle class is intricately tied to that of the corporate sector, and thus any sign of dwindling middle-income class must be associated with growth-stagnated corporate sector, which in turn causes economic growth stagnation as well as the loss of jobs. This is the process by which an economy ends up with low growth and worsening income distribution.

According to GTED, this scenario seems the most plausible reason for the current global economic problem with a chain of reactions as follows; egalitarian economic and social institutions and polices → killing the incentive to grow and encouraging moral hazard → low growth of overall corporate sector and the aggregate economy → no or less job creation with more social welfare demand → increasing pressure for government expenditures for welfare without corresponding tax revenues → mounting government debts → global financial crisis with low growth and income polarisation.

Having the social policy as well as the economic policy destroy the very incentive to grow, how could we expect economic growth and development? One can characterise the current situation as an "egalitarian trap". GTED implies that it is imperative for developed as well as under-developed economies to get out of this "egalitarian trap" if they want to get over the low growth and polarisation dilemma. The solution is to turn to the non-egalitarian political-economy regime, keeping to the ED principle, such as free market democracy. I have been arguing that it is necessary for economic prosperity to adopt a free market democracy, respecting and allowing ED principle, rather than the today's popular egalitarian democracy seeking economic equality while disregarding the ED principle. This argument is also confirmed by the long history of economic development of the West as well as the Orient.[7]

IV. A NEW EMPIRICAL FRAMEWORK FOR MACROECONOMIC GROWTH AND PRODUCTIVITY ANALYSIS, AND EMPIRICAL RESULTS[8]

According to GTED, capitalist economy has been led by the corporate growth and as such, should rather be called a corporate economy than a market economy. This section intends to show how this claim can be substantiated in terms of an analytical model, and how this new model can be compared to the neoclassical production function model as well as growth accounting model, as an instrument to analyse the macroeconomic growth and productivity. Furthermore, this section will also report the empirical test results of three hypotheses with the new model as follows; (1) corporate-led growth, (2) corporate concentration-led growth and (3) corporate-led shared growth.

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[7]See Jwa (2017) and Jwa and Yoon (2004) for more detailed discussion on the choice of more development-friendly political economy regime.

[8]This section is adopted from the Appendix of Jwa (2017) with some modification.

Note that one of the most important implications of GTED is that "the economy will grow faster in the shared manner, as the corporate sector grows faster and even in a more concentrated and unbalanced way". As already implied in the previous section, the ED principle, as a necessary condition for economic development, is the logic behind these hypotheses. Unbalanced faster growth of corporations, supported by the market as well as the government will bring faster economic growth, which in turn contributes to shared growth by pulling the economy out of stagnated agrarian-type developing economies and out of the old industrial structure as well as even out of the stagnated developed economies.

(1) Basic Model

Take the basic linear model for simplicity,

$$gdp = f(CA) = \alpha + \beta_1 CA + \varepsilon \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

where the constant α captures pure value of agrarian market economy,

gdp is per capita gross domestic product,
CA is per capita corporate asset,

this gives

$$\frac{\partial\, gdp}{\partial\, CA} = \beta_1 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

as the marginal product of CA to gdp, and taking logs for the Equation (1), gives an elasticity of gdp w.r.t. CA.

This is the simple model that captures the essence of a corporate economy, implying that national economic performance can be explained by the corporate sector growth. Some interpretations of the variables and parameters are in order. Because corporate asset, which is conventionally available from the corporate balance sheet (B/S), does not include the labor input. It may be necessary to use the per capita corporate asset, in order to avoid the inconvenience in empirical analysis of having labour as additional direct input in Equation (1), which amounts to assuming that the Equation (1) is a linear homogeneous function with respect to labour input. Furthermore, it may be better to use total population rather than total employees as the deflator for the per capita corporate asset, to be consistent with the convention of using the concept of the per capita income rather than per employee income, while the choice of the deflator does not much matter under the linear homogeneity assumption. From this consideration, CA, the total corporate asset deflated by the total population, is adopted as a proxy for the total productive assets per person in use of any society, including the tangible as well as intangible assets such as physical capital, technology, knowledge and all others except for labor input. Hence, coefficient of CA, β_1, is the marginal productivity of corporate sector and can be a proxy for the national overall productivity and therefore, national competitiveness.[9]

gdp is, in fact, the perpetual annuity flow of income from the total productive

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[9]If it is assumed the Equation (1) is a quadratic equation as $gdp = \alpha + \beta_1 CA + \beta_2 CA^2 + \varepsilon$, then the marginal product will depend on CA as $\frac{\partial\, gdp}{\partial\, CA} = \beta_1 + 2\beta_2\, CA$ and will be subject to the increasing, constant or decreasing returns to the scale of the corporation depending on β_2 being positive, zero, or negative, respectively.

resource stock of the society with the discount rate being the coefficient of CA.[10] The constant term, α represents the per capita agrarian product under a pure agrarian market system when the corporate sector is removed from the capitalist system. Lastly the error term ε measures the level of the efficiency of socio-economic institutions including the political institution, which will be elaborated in the following section.

(2) Implications of the New Framework

(i) *Market vs. Corporate Production Function*

The popular neoclassical production function, y= f(K, L, T) has an underlying assumption that the market will produce y, given the supply of capital (K), labour (L) and technology (T) and therefore, can be called a *market production function*. Thus, the corporation is decomposed into K, L and T and given no active role in organising resources for production. Note that this decomposition has followed the reductionist approach of analysing the constituent parts rather than the whole, which has been a scientific tradition since Isaac Newton. However, this convention is no longer consistent with the recent complexity science that takes a holistic view of the world as well as the economy. According to the new holistic view, the corporation should be treated as an emergent whole to generate synergy effects by organising resources under the umbrella of the command and control. This is in contrast with the neoclassical production function approach, where the corporate firm is disassembled and the synergy effects are hard to capture.

This new approach can be associated with a *corporate production function*, as it assumes that corporations will organise national resources and produce under its own management control, given the factors of production supplied by the market or the society. The new model is consistent with the holistic view of the economy. It can be argued that the new approach must be more relevant to the analysis of capitalist economy led by the corporate growth, as it is reviving the complex nature of modern corporations, while the existing market production function may be representing the simple economy, like the agrarian economy without the modern corporation.

(ii) *Issue of Measurability of Factors and Productivity*

Given the fact that the difficulty in measuring physical capital, human capital and the level of technology is the fundamental impediment to the accuracy and usefulness of the neoclassical market production function approach, the new corporate production function model can help effectively bypass all these measurement difficulties. Note that the Cambridge capital controversy on the measurability and aggregation of capital during the 1960s-70s between the two Cambridges in England and the US has still not been resolved.[11] Mainstream neoclassical economics, however, continues to implicitly assume away these measurement issues, including the quality of labour, the level of knowledge and the level of technology. The

[10]The present value, A of permanent flows of incomes can be expressed as follows; A=a(1/(1+r))+a(1/(1+r))^2+a(1/(1+r))^3---+a(1+/(1+r))^t =a(1/(1+r)(1/(1-(1/(1+r))) =a(1/(1+r)((1+r)/r)=a/r, where "a"=permanent flows of income and "r" is a discount rate. Now, this equation can be rewritten as follows, a=r·A, which is the basis for the Equation (1) in the text, and where "a" can be reinterpreted as annual *gdp*, "r" as national marginal product and "A" as corporate asset, a proxy for the national stock of productive assets.

[11]See Cambridge capital controversy in wikipedia.

economics profession has been dwelling on something impossible to do. At the same time, neoclassical growth accounting model adopts the market production function as a basic framework, where the residual (error) term of the market production function estimated with capital and labour as factors is given a special name, *total factor productivity (TFP)*, which is interpreted as a contribution of technology to production. While TFP has been the focal point of neoclassical growth accounting analysis, given all those exisintg measurement problems, how much trust one can have with the popular TFP measurements?

It is hoped that the GTED new model can supplement the existing production function approach, by filling up the missing link between the diverse factors at the micro level and the aggregate output, by introducing the role of the modern corporation as a supreme aggregator which transform such diverse tangible as well as intangible resources into "corporate assets" and as a coordinator of production, theoretically as well as empirically. We may still need to do what has been done with the existing production function analysis but the new model of the corporate economy will definitely help alleviate our burden of aggregation and measurements. Of course, the next task for the new approach may be how to improve the database of the corporate sector to improve the accuracy of the empirical analysis for growth and productivity measurement.

(iii) *Further Interpretation of Corporate Asset, CA*

Some additional thoughts on the economic meaning of "corporate asset", CA, are in order. CA is not the measure of total existing stock in the society but the actively utilised stock by the society's productive unit of corporation. Even if some resources are useful for production, those resources are merely potentially productive; they do not become productive until they are actually utilised by the corporation. Therefore the corporation should be viewed as an entity that transforms potentially productive resources into real resources for actual use. The importance of this distinction between potential and actual productive stocks of a society can easily be seen if one understands the true nature of the role of the knowledge stock of scientific innovations and discoveries for economic development. Note that even if there are ample flows of such knowledge, they will be of no use unless they are fully utilised and transformed into the valuable goods and services by the corporations. This is one of the most important cases for the concept of the corporate economy to be necessarily incorporated into the growth and development economics. A small size of actual CA, relative to the estimate of the economy's existing total stock of potential productive assets, may mean that the corporate sector does not or cannot fully utilise the potential of the economy, probably due to the inefficiency of the society's institutions, such as anti-corporate culture or sentiments, regulations on the corporate activities and other impediments to the corporate sector. Note after all that corporations are the by product of the society's rules of the game.

(iv) *Analysis of Efficiency of Socio-economic Institutions*

Now it is time to elaborate the role of the error term in Equation (1) as reflecting the efficiency of the society's economic institutions. According to GTED as well as the new institutional economics, the corporate firm, represented by its behaviour and performance, is the eventual outcome of survival, by adapting to the surrounding environment given by the society's rules of the game, consisting of formal as well as informal constraints or institutions. The formal constraints include formally written laws,

regulations and so forth, while the informal constraints include culture, tradition, value system, convention and political ideology and so forth. More importantly, it is politics that can ultimately influence the society's rules of the game. Equation (1) can be seen to provide a convenient framework to analyse the impact of all these institutional constraints on national economic performance. The error term can be interpreted as effects on the economy of the institutional environment in general, after taking into account of the overall contribution of the society's useful stock of economic resources to the economy by the corporate sector asset, CA and can be utilised as the measurement of the society's institutional efficiency including politics. Assumptions of the distribution of error term may be relevant here. It has been known that impacts of the institutional change will show a long lagged process, sometimes with a decade or longer or even a generation lag. In this regard, the error term, ε, may not be independent and identically distributed but could be serially correlated especially in the context of time series analysis, which needs to be more carefully analysed to understand the nature of institutional effects.

(3) Empirical Results

Now, this section will present the empirical test results of three hypotheses, already stated above by utilising the new model as follows; (1) corporate-led growth, (2) corporate concentration-led growth and (3) corporate-led shared growth.

At the outset, some explanation for the data set is in order. Per capital GDP and income GINI coefficient are from the World Development indicators, the World Bank. The per capita corporate asset, CA, is the total sum of the outstanding assets of all the listed companies' B/S from the S&P Capital IQ divided by the total population, in which the nationality of corporation is determined under the condition that both the locations of the company's headquarter as well as of its listed market should belong to the concerned country's sovereignty. All are in US$ and in current price as the corporate asset is available only in current price.

The total number of the sample amounts to 639 of the panel data, with time and cross-section data pooled for 71 countries during the period of 2005-2013. The data on income GINI coefficient, however, are sparsely provided compared to the GDP and corporate asset data, so that when the income GINI coefficient is utilised (Equation 4 and 5 in Table 2 below), the number of sample is reduced to 363 data points for 66 countries for the unbalanced periods, and the panel data also becomes unbalanced. Data correlation matrix of variables utilised is reported in Table 1. The regression is done with the fixed effects panel estimation, the results of which are reported in Table 2.

Table 1

Data Correlation Matrix

	GDP	GINI	CA	CHHI
GDP	1.000000	−0.461993	0.804771	0.247549
GINI	−0.461993	1.000000	−0.273884	−0.312958
CA	0.804771	−0.273884	1.000000	0.131096
CHHI	0.247549	−0.312958	0.131096	1.000000

Note: GDP=per capita nominal GDP, CA=per capita listed companies' total nominal asset, GINI=income GINI Coefficient scaled up to "0 to 100", CHHI=Herfindal-Hirschman Index of listed companies' total asset measuring the corporate sector concentration.

Table 2

Fixed Effects Panel Estimation with Time Dummies

Model	Coefficients	Estimation Results
	α	5.500 (27.43)***
Equation 3 $\ln GDP_{i,t} = \alpha + \beta_1 \ln CA_{i,t} + \beta_2 CHHI_{i,t} + td_t + \epsilon_{i,t}$	β_1	0.390 (17.27)***
	β_2	0.00002 (1.74)*
	R^2	0.753
	α	49.448 (13.52)***
Equation 4 $GINI_{i,t} = \alpha + \beta_1 \ln CA_{i,t} + \beta_2 CHHI_{i,t} + td_t + \epsilon_{i,t}$	β_1	−1.452 (−3.63)***
	β_2	0.0002 (0.97)
	R^2	0.191
	α	77.650 (11.67)***
Equation 5 $GINI_{i,t} = \alpha + \beta_1 \ln GDP_{i,t} + td_t + \epsilon_{i,t}$	β_1	−4.385 (−6.21)***
	R^2	0.258

1. *ln* means natural logarithm.
2. Values in parenthesis are robust t-values.
3. ***, **, and * indicate 1 percent, 5 percent, and 10 percent level of significance, respectively.

(i) *Corporate-led as well as Corporate-concentration-led Growth*

GTED implies the corporate-led and corporate-concentration-led growth for the capitalist economy. To test these hypotheses, Equation 1 is estimated by regressing the log per capita GDP on the log per capita corporate asset, CA and the corporate sector concentration ratio, CHHI, as shown by Equation 3 in Table 2. An interpretation of the estimated results is as follows: first, it is found that the estimate β_1 is statistically significant; implying the estimated elasticity of per capita income w.r.t. the per capita corporate asset of 0.39, which means 1 percent increase of per capita corporate asset will generate 0.39 percent increase of per capita GDP on average in the world economy. Note here that the estimated Equation 3 is in fact the world corporate production function. This result supports the hypothesis of corporate-led growth. Second, the coefficient of CHHI is positive but its significance level is relatively low. The corporate-concentration-led growth hypothesis may not be rejected though.

In addition, we may interpret the constant term in the panel estimation as the average effect for the whole sample remaining, after taking out idiosyncratic effects of individual countries. Therefore, we may suggest that the average per capita income of an imaginary agrarian economy for the world without the corporate sector would be about $245, which is the natural number translated from the estimated constant term of 5.5 in model 3. This estimated level of per capita agrarian income is presumably not far away from what we may expect in reality.

(ii) *Corporate-led Shared Growth*

GTED implies corporate-led shared growth as well. To test this hypothesis, the income GINI coefficient is regressed on the log of per capita corporate asset, CA, and corporate sector concentration ratio, CHHI. The result is shown by Equation 4 in Table 2. The result implies a 1 percent increase in per capita corporate asset will reduce the income GINI coefficient by 0.0145, while the coefficient of the corporate sector-concentration turns out to be statistically insignificant, implying it may not improve or worsen income distribution. In addition, the constant term estimate 49.45 implies that the GINI coefficient would be roughly 0.5 for the imaginary agrarian economy, stripped completely of the corporate sector.

Now, one can see that a 1 percent increase in per capita corporate asset leads to a 0.39 percent rise of per capita GDP by Equation 3 and a 0.0145 reduction of the income GINI coefficient by Equation 4, which confirms a basis for corporate-led shared growth.

(iii) *Growth-associated Improvement of Income Distribution*

Finally, while the estimated Equations 3 and 4 imply that the growth of capitalist "corporate economy" will bring about shared growth, Equation 5 directly estimates the relationship between the GINI and GDP growth as shown in Table 2. The scatter diagram is shown in Figure 4.

The result shows a 1 percent increase of per capita GDP is associated with a 0.0439 decrease of income GINI coefficient which, as Equations 3 and 4 implies, is driven by corporate growth which may be the latent variable. This result indicates that the usual popular argument— that growth is accompanied by increasing inequality and capitalism must be reformed [Stiglitz (2012); Piketty (2014)]—needs to be reconsidered. Furthermore, this result also implies the need to rework the existing diverse findings on growth and distribution issues, such as the inverted U-shaped curve found by Kuznets (1955) and others.[12]

Fig. 4. Shared Growth
(Scatter Diagram of GINI Coefficient and Per Capita GDP)
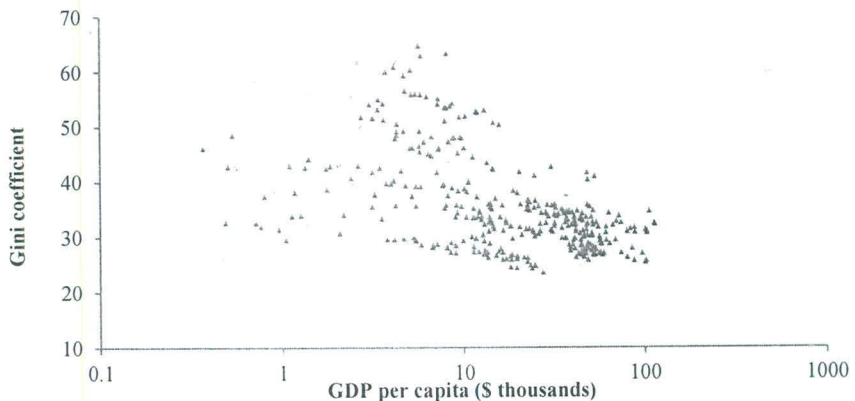
Note: Pooled data for 66 countries for the unbalanced periods over 2005 to 2013.
Source: S&P Capital IQ & World Bank.

[12]I checked whether the data in the Figure 4 supported the inverted U-shaped curve as argued by Kuznets but the result did not support it.

The empirical results have shown at least that without taking account of the dynamically growing corporate sector, the capitalist economy has no chance to grow and develop in a shared way, contrary to the popular myths that corporations, especially the large ones, are the source of economic inequality and that capitalism itself is the source of income inequality. This section has further shown that the GTED-based empirical model can be a useful supplement to the existing neoclassical production function model to analyse the macroeconomic growth and productivity.

V. KOREAN EXPERIENCE OF THE SHARED GROWTH FOLLOWED BY POLARISED STAGNATION, COMPARED TO PAKISTAN

(1) Korea's Miracle Led by Park Chung Hee's ED Leadership

Korea has been praised as one of the best shared growth experiences during the developmental era, 1960s-1980s [World Bank (1993) and Figure 5].

Fig. 5. Shared Growth Experiences (Average Over 1965-89) Per Capita Income Growth
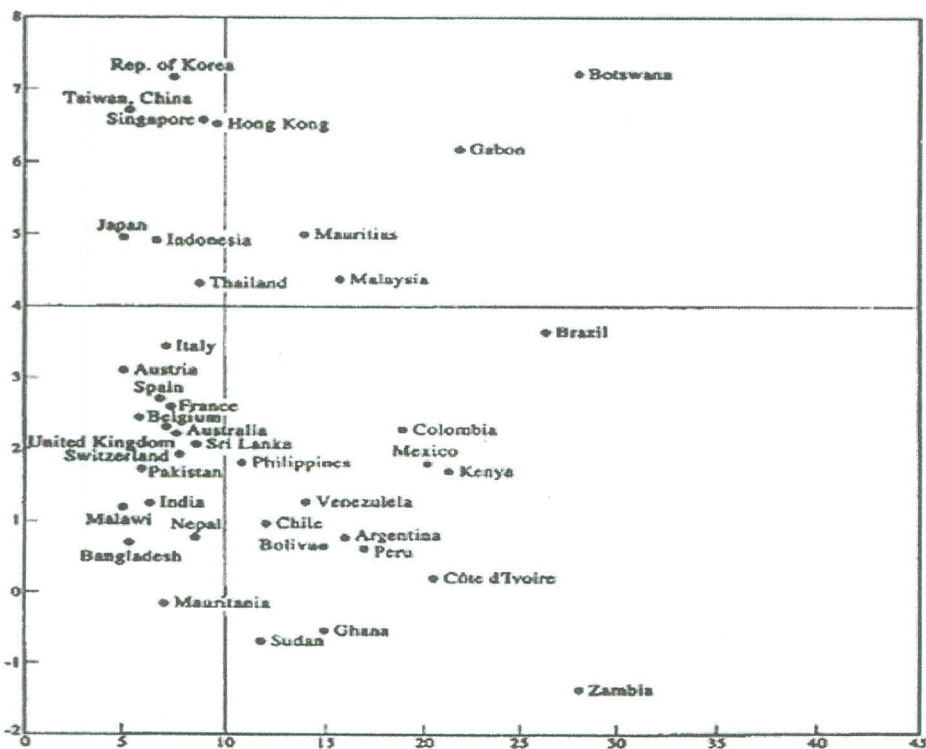
Upper 20 percent/lower 20 percent income
Source: World Bank (1993), p. 31.

Arguably the single most critical factor in Korea's development success in this era was the leadership of Park Chung Heel. First and foremost, Park had always placed economics before politics, or in terms of this paper's jargon, he did his utmost to prevent

populist democracy from distorting the ED principle in economic policy making and implementation. He did so by even leaning to a rather authoritarian regime, in spite of severe criticisms by domestic opponents as well as foreign allies. Second, he always respected ED-market principles, and applied and implemented the ED principle to all economic as well as social policies by helping those who help themselves. Third, he always kept to the ED-corporate promotion policies to help grow the corporations as a means of expanding economic activities, instead of "colonisation by strong army under the imperialism". Finally, he was a true leader of nation, with firm commitment to economic development for people and exercised his authority without corruption. Thus, Park's leadership can be dubbed as "ED leadership".

Economic policies under Korea's era of developmental state all adopted the ED policy, which promoted keen competition among corporations, entrepreneurs and rural villages;

(i) Export Promotion policy by helping only those who deliver better export performance.

(ii) Heavy and Chemical Industry Drive (import substitution policy) by allowing only the most capable exporters to enter the HCI sector.[13]

(iii) Promotion of SME and large corporations by helping only those who perform better in export.

(iv) Saemaul Undong (SU: rural development campaign) by helping only villages who deliver positive outcome with self-help spirits. With ED incentive structure built into it, the SU was able to transform the mindset as well as behavior of rural people in a sustainable and indigenous way.

Note that Park's ED leadership was successful in changing peoples' ideology, historical tradition and culture. Knowing all too well, the debilitating psychology of dependence and blaming others for their own failure, Park's leadership, instead, fostered the kind of self-help, diligent and cooperative mindset, that is most developmental-friendly by keeping to the dictum of "God help those who help themselves".

(2) Korea's Economic Stagnation and Worsening Distribution Led by Egalitarian Democracy

Korea turned away from the Park Chung Hee paradigm to egalitarianism since Park passed away in 1979. Thereafter, slowly first under the following authoritarian government and rapidly later on after the political democratisation in late 1980s, Korea has turned into an Egalitarian Democracy. For the last 30 years following this trend, Korea's economic policy paradigm has fallen into the "egalitarian trap" of making things even, disfavouring the large, the successful and the prospering groups of people,

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[13]Korean government required the potential entrants to provide the minimum 25 percent of so large capital requirements of the HCI and the government loaned the remaining 75 percent. So only the best export performers were able to enter the HCI because even the minimum self-provision of the capital was still too big for most of the then Korean corporations. If this is to be applied to the Pakistani case, for example, one may probably think of allowing better exporters to take over the SOEs with reasonable prices, by requiring a certain minimum own seed-capital to be put in which is not debt-financed.

organisations, corporations, schools and regions. The new paradigm favoured the small, weak, poor and stagnating ones. Specific examples are as follows:

(i) Regulate the large corporations because they are too big, becoming stumbling blocks to "economic democracy" which is not very different from the socialist ideology, seeking economic equality and balance.

(ii) Support S&ME because they are small and weak not because they are performing good.

(iii) Support farmers because they are weak not because they behave as self-help and are performing well.

(iv) Regulate metropolitan region and support all locals equally to achieve a balanced regional development.

(v) Disfavour Seoul universities but favour local universities for balanced growth in university and regions.

(vi) Introduce various surtaxes on the rich.

(vii) Introduce educational system to equalise student performances across the schools and regions.

(viii) Economic development policy in general and industrial policy specifically turned into egalitarian policies (Ex. venture promotion, new industry promotion, green growth initiative, creative industry promotion, etc).

Here, the ED principle has not been at work. The economy has not performed as in the earlier stages of economic development, turning into an era of growth stagnation and worsening income distribution, as shown in Figures 6 and 7. Is this the end of Korea's economic development? Korea now is at a crossroads of whether she will continue on the path to a deeper egalitarian trap or fortunately get out of it and turn towards a growth path once again.

Fig. 6. Korea's Potential Growth Rate Trend
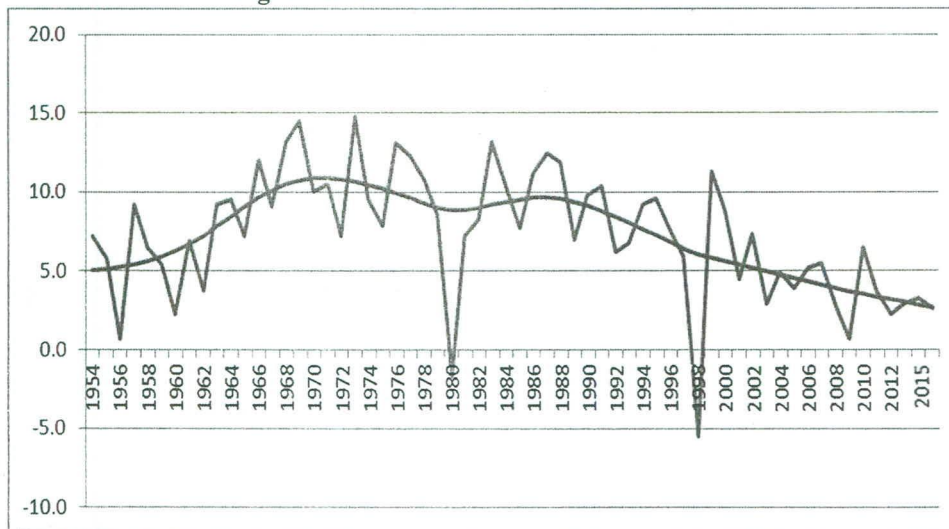
Data Source: The Bank of Korea. *Note:* Blue line; actual GDP growth rate and Red line; potential GDP growth rate which is the author's own calculation by applying the Hodrick-Prescott (H-P) filter.

**Fig. 7. Korea's Worsening Income Distribution in Terms of Gini Coefficient since 1990s**
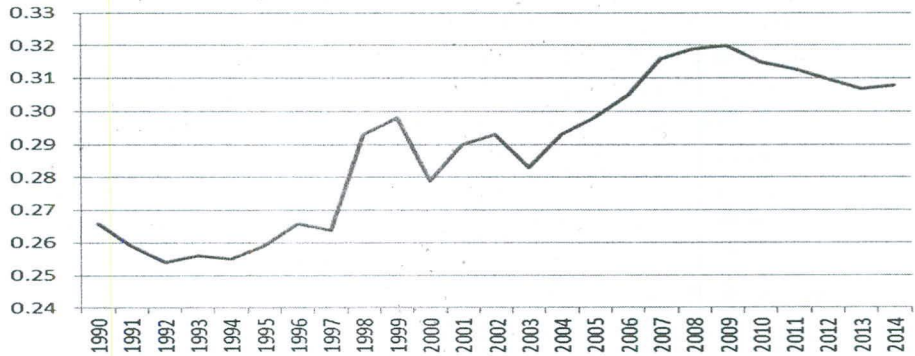
Note: Gini Coefficient of Urban Households. *Source:* Bureau of Statistics, Korea.

(3) Pakistan Compared with Korea

Now it is time to consider the implications of GTED in terms of why Pakistan has been lagging behind Korea in terms of growth since the 1970s, even though Korea learned its development knowhow from Pakistan in the early stages of development. (Compare Figure 6 and Figure 8). What are the differences and similarities between Korean and Pakistani economic performances during the last 70 years?

Korea and Pakistan began their growth game from almost the same starting line in the late 1940s. Pakistan took the lead until the end of the 1950s, from which Korea even learned how to write economic development plans. Both had run at a similar pace, until the end of the 1960s. However, the growth pace began to turn favourable to Korea since the 1970s, with Korea outpacing Pakistan at an exceptional rate for over 40 years. In terms of the level of development, Korea had already reached that of the developed economies, while Pakistan is still working hard to catch up. In recent decades, however, Korea's growth has been rapidly slowing down, converging to and even becoming lower than Pakistan. What accounts for these differences?

Fig. 8. Pakistani Potential Growth Trend
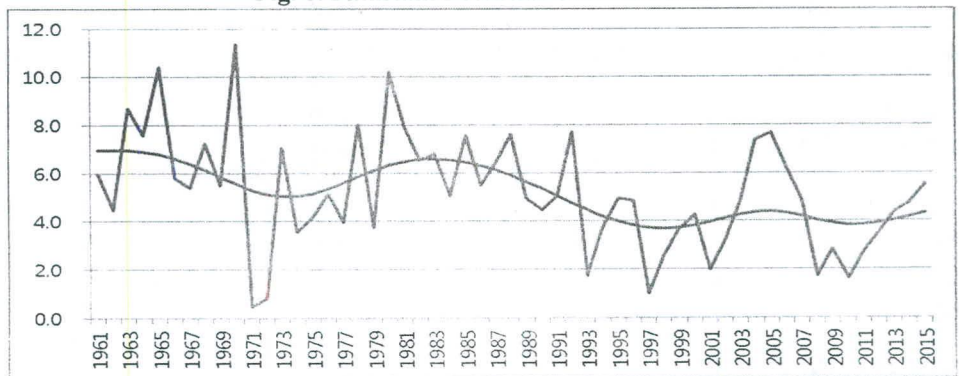
Data Source: World Development Indicators, the World Bank. *Note:* Blue line: actual GDP growth rate, and Red line: potential GDP growth rate which is the author's own calculation by applying the Hodrick-Prescott (H-P) filter.

From the GTED perspective, the key factor behind the divergence between the two countries since the 1970s seems to lie in their different policies toward corporations. In the early 1970s, Pakistan took the radical turn to a policy of nationalising major corporations under the then still popular socialist ideology. In contrast, Korea under Park Chung Hee's strong anti-socialist and ED policy paradigm continued to amplify the corporate promotion policy, by adopting the Heavy and Chemical industry (HCI) drive, following the export-led growth strategy of the 1960s with strong supportive policies for corporations.

Pakistan took the nationalisation policy of corporate sector from 1972 to 1976 under the banner of "Economic Democracy", which is none other than a pseudo-socialist ideology. Some details are as follows:[14]

(i)   1972: 31 large corporations including 22 family-owned and managed corporate groups were nationalised.
(ii) 1973: Constitutional reform to legitimise the nationalisation of large corporations for de-concentration of economic power and protection of SM&Es and farmers.
(iii) 1974: 13 commercial banks, over a dozen insurance companies, two petroleum companies and 10 shipping companies were nationalised.
(iv) 1976: More than 2000 traders in agricultural sector were nationalised in order to eliminate the middleman margin.

On the other hand, Korea continued a journey towards a corporate-led growth strategy up until the late 1980s, while she began to deviate from it since then upon political democracy. From the 1990s, Korea turned to an egalitarian economic policy regime under economic democracy which is similar to but in lesser degree than the Pakistani anti-corporate growth policy of the 1970s. Pakistan since the 1990s has been trying to privatise the SOEs without much success, at least judging from the corporate-ED policy perspective. Both economies have been suffering from anti-large corporation policies which seem to be the cause for the slow growth, despite many contemporary innovative policy initiatives by both countries. However, Pakistan seems to be coming back with more corporate-friendly policies in recent years, whereas Korea is continuing towards further stagnation with anti-corporate growth policies under the egalitarian trap.

VI. CONCLUDING REMARKS

This paper, after critically reviewing the literature on recent institutional approaches for shared growth, briefly presents A General Theory of Economic Development (GTED) developed by Jwa (2017), as the basis for discussion of shared growth. The GTED argues that Economic Discrimination (ED) by Markets, Corporations and Government is a necessary condition for shared economic development, while Egalitarianism by any one of them is sufficient condition for economic stagnation. ED means treating the different differently while Egalitarianism is an antithesis to ED. The GTED further argues that the capitalist economy is indeed "a corporate economy", in which the modern corporations lead the path toward shared growth. The paper presents a new empirical framework for analysing macroeconomic growth and productivity,

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[14] Wikipedia.

consistent with a corporate economy implied by the GTED. It provides the empirical results that a 1 percent increase of per capita corporate asset brings about roughly 0.4 percent increase in per capita income and a decrease of income GINI coefficient by 0.015, supporting "the corporate-led shared growth hypothesis" of the GTED. Finally, the paper applies the GTED to discuss the dramatic experiences of the rise and fall of Korea's economic development and examines the stagnated Pakistani experience over the last 60 years, with the conclusion that the growth stagnation for both countries has been due to the anti-corporate- growth policies led by egalitarianism, while the growth era coincides with the ED corporate-growth policy.

A few more final words are in order. This paper warns against the most popular sentiment today, among the world intellectuals and even economic professions that economic inequality is the Devil monster while economic equality is the Angel. It should not be forgotten that "Economic inequality is a necessary condition for economic development, while economic equality is a sufficient condition for economic stagnation"! Natural inequalities emerging from markets as well as government discrimination function based on the market performances, should be most welcomed while artificial social as well as economic inequalities arising from arbitrary government intervention to favor special groups with political motivation, should be actively prevented. After all, capitalist economic development is the natural process of unequal but shared development. In this regard, it is worthwhile recalling the process of development, i.e. free-riding on the others' success knowhow. This in fact implies that having a prosperous neighbour is good for our development as we do "exploit" them, which becomes the basis for shared growth. However, remember that Karl Marx and pro-socialist ideologists have been arguing the other way around, that having prosperous neighbour is bad for our development as they will exploit us. GTED implies Karl Marx is standing on his head.

Finally, it may be interesting to see how the GTED is compared with the now most popular neoclassical growth accounting model (NGAM). Unfortunately, NGAM is nothing more than an accounting theory or even worse, a tautology to describe the endogenous variable by another set of endogenous variables without knowing the exogenous explaining variables. This is the reason why NGAM has difficulty explaining the current economic dilemmas faced by the world economy. Why the world economic growth has now been performing worse than before, even with much more developed levels of the human and physical capital and technology as well as much more refined domestic market institutions, is not readily explained by NGAM. Without knowing the fundamental factors behind development, NGAM and the Washington consensus continue to tell us tautologically what to do in order to be a developed economy. They include, for example, the need to improve human and physical capital and technology as well as economic institutions. But they do not tell us much about how to get those done. Similarly, while strong voices have been heard to argue for a shared growth in recent years, we still don't know much about "How to achieve such a growth?" which is what GTED intends to answer by trying to pin down or discover the fundamental exogenous factors to explain the process of development. The GTED concludes that an ED incentive system is the key and necessary condition to unlock the mystery of economic development as it can help create something out of near nothing. Modern corporations as well as individual farmers, researchers, individual workers and even the public servants

motivated under the ED-incentive system can, in a concerted manner, create the physical capital, human capital and technology, as well as institutions, needed for economic development from the bottom and facilitate the objectives of a shared growth.

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Forest Wood Consumption and Wood Shortage in Pakistan: Estimation and Projection through System Dynamics

NAILA NAZIR, LAURA SCHMITT OLABISI, and SALMAN AHMAD

Consumption rates of major forest products such as timber and firewood, place significant strain on wood stock and forest area in Pakistan. With the country's rising population, the consumption of these two major products is increasing because of the growing energy demand, and no alternative products are likely to replace wood consumption in the near future. We apply system dynamics modelling to an analysis of the forestry sector in Pakistan for novel insights into the drivers and future trajectories of wood consumption. The present research is based on time series macroeconomic data from 1990-2010 and projections to 2040 of wood supply, forest area, population growth, wood extraction, wood imports and different uses of wood in the country. The study reveals that there is no significant increase in area under forest, while consumption of firewood and timber has increased. The consumption of firewood is greater than timber consumption in Pakistan, both in percentage share and in total volume of wood consumption. The sustainable supply of wood is less than wood consumption, and with population growth this gap is increasing; wood supply from agricultural lands is a viable option to fill the gap.

Keywords: Wood Consumption, Sustainable Wood Supply, Projected Wood Shortage

I. INTRODUCTION

The forestry sector's contribution to Gross Domestic Product (GDP) in Pakistan was 1.2 percent in 1990, decreasing to 0.6 percent in 2011 [FBS (2014)]. If farmland forestry products are included, the forestry share would increase to 1.58 percent to the GDP. The forestry business generates revenue that is equivalent to 10 percent of the country's exports [FAO (2009a); FAO (2014a)].

In a country where the forest area is very low and deforestation rate is high, it is imperative to look into the forest wood resource supply and consumption. There is a consensus that high population growth, over-exploitation of wood resources, over-grazing and poor land-use management are the main causes of deforestation [Ouerghi (1993); NIPS (2009); Mather and Needle (2000); Qasim, *et al.* (2013)]. In developing countries, wood energy represents approximately 15 percent of the total primary energy

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consumption [Trossero (2002)]. The share of Pakistan's consumption of conventional wood and biomass energy, as a portion of the total energy in 1993-94 was 46 percent [FAO (1997b)]. The FAO (2009a) estimated that the share of wood energy as a portion of rural energy consumption in the country is 37.52 percent. Despite a high level of dependence on wood biomass, there is no data or insufficient data for wood supply and consumption in Pakistan [Nazir (2009)]. This presents a barrier to natural resource planning [FAO (1997a)]. Information regarding the use of fuel wood and traditional fuels was mainly based on rough estimates, until the Household Energy Strategy Study (HESS) was undertaken [Ouerghi (1993)]. Khalil (2000) also pointed out that in Pakistan the major constraints in environmental resource valuation are irregular and unsystematic data collection across authorities, responsible for data collection; the absence of complete sets of data and absence of data adequately describing the multi-disciplinary environmental and cross resource issues. The values of total consumption of wood in Pakistan are based on per capita wood consumption [see for example, Pakistan (2005); Mathtech (1988); Sheikh (1990); FAO (2009a); Clark (1990)]. Some studies consider sources of wood supply in the country, but lack time series data on the volume of wood supplied by each source [Clark (1990); Pakistan (2005, 2010)].

There is a need to add data and analysis to the on-going efforts to construct data sets for natural resources in Pakistan. Estimating and forecasting domestic wood consumption is also important to check the patterns, prices of wood and import of wood products. The present research is one such effort that focuses on estimating and projecting few key variables related to wood consumption, wood supply and sustainable wood supply in the country.

Economic and environmental management uses several different tools for estimation and analysis. Different modelling techniques are used to address natural resource issues, for example, Geospatial techniques [Bhalli, *et al.* (2012)]; Spatial explicit models, Aspatial models [Seto and Kaufmann (2003)]; Multi-agent systems models [Parker, *et al.* (2003)]; Stochastic models and Behavioural models [Irwin and Geoghegan (2001)]. Simulation or mathematical modelling is an important tool for interaction between economic and environmental fields [Khalil (2000)]. However, dynamical models are more useful as these consider temporal lags and nonlinearities; have strong interface for scenario testing [Agarwal, *et al.* (2002); Olabisi (2010)]; cover all the affecting forces [Yu, *et al.* (2011)] and consider feedbacks in a system [Veldkamp and Lambinb (2001)]. System dynamics methodology considers dynamic behaviour of the components in a system [Sterman (2000); Musango, *et al.* (2012)]. Computer based System Models are developed by constructing stocks and flows of information, material or data as sets of differential equations, linked through intermediary functions and data structures [Gilbert and Troitzsch (1999)]. Time is broken into discrete steps to allow feedback. Human and ecological interactions can be represented within these models, depending on the causes and functional representation [Baker (1989)].

System dynamics is a new approach in Pakistan for analysing wood consumption in the country. Using this methodology, the present study is designed to address the question: What is the sustainable wood supply gap (consumption minus sustainable production) in Pakistan? The main aim of this study is to build a system model for the forestry sector that covers wood products; timber and firewood; wood stock availability;

forest area; sources of wood supply; population growth and consumption of wood. The objective of the study is to discuss the changing trends of timber and fuel wood supply from State forests, farmlands and from imports. It also aims at discussing the use of wood for household, for industries and for commercial sectors. The gap between wood consumption and wood supply for Pakistan would be estimated over time. A policy option of doubling the growth of wood supply from farmlands would be considered to check wood consumption and sustainable wood supply gap.

This model would be a reference model for estimating and projecting wood resources in a country, using Pakistan as a case study. The contribution of the present study is the development of a methodology which may be helpful in conducting research around natural resource extraction, when there are data gaps.

II. FOREST AREA AND DEFORESTATION IN PAKISTAN

Humanity's Ecological Footprint is spread across six land use categories: cropland, grazing land, fishing grounds, built-up area, land for carbon absorption and forests [Kitzes, *et al.* (2007)]. The global forest area is approximately 4 billion hectares; about 7 percent of this is planted forests [FAO (2014a)]. Pakistan has 4.5 million ha. forest area (5.1 percent of the land area). The per capita forest area of 0.03 hectares is well below the world's average of 1 hectare [Bukhari, Haider and Laeeq (2012); PFI (2004)], and this amount is further decreasing with the growth of population. According to EUAD (1992), deforestation was 0.2 percent (7,000 to 9,000 ha per annum) in the 1980s. Conifer forests have been declining at the rate of 1.27 percent per annum since 1992 [Pakistan (1992); Ahmad, *et al.* (2012)]. The FAO (2009a) reported deforestation of 39,000 ha per year in the 1990s in Pakistan. According to FBS (2010), Pakistan's annual deforestation rate in 1999-2000 was between 1.8 percent, and was 2.1 percent during 2000-2005. Studies support the argument that deforestation in the Himalayan region is caused by increasing the human population [Eckholm (1975, 1976); Sterling (1976); Lall and Moddie (1981); Myers (1986)]. The IUCN (2002) has estimated that with the on-going rate of population growth, wood consumption in Pakistan would increase by 3 percent per year. Some studies indicate that rural fuel wood requirements do not seem to be a major cause of deforestation in designated forest lands in Pakistan [Ravindranath and Hall (1995)] while some other studies show that one of the main reasons for deforestation is timber and firewood harvesting in the country [FAO (1997c); Sheikh and Hafeez (1977); Knudsen (1995); Ali (1999)]. In the Western Himalayan region, in the Northern Areas (NAs) of Pakistan fuel wood consumption by local people is one of the causes of deforestation [Ali and Benjaminsen (2004)]. However, in forest-rich Northern Areas (NA) of Pakistan, population growth is slow. Ali and Benjaminsen (2004) attribute forest cutting in this region to the presence of timber smugglers [Yusufzai (1992)], who take the fallen wood and dead wood which was previously collected by locals as fuel wood, thus leaving the local people to harvest wood from public forests. In other words, commercial harvesting and corruption contribute to deforestation. The construction of the Karakorum Highway (KKH), linking Pakistan with China, is also contributing to deforestation [Schickhoff (1995); Ali and Benjaminsen (2004)]. Some studies are showing population growth as the prime threat to forests [Lodha (1991); Patil (1992); Dijk and Maliha (1994); Ahmad (1994); IUCN (1998); Payr (1999)] while others argue that blaming

population growth is sometimes considered an over simplification of the complex problem of resource management. Other factors, like government policy on infrastructure development, including the forest clearance for other land use and increasing cash crop production are important causes [Nazir (2009); Ali (2004); Ali, *et al.* (2006); Wannitikul (2005); Write and Muller (2006); White and Dean (2004); Burgi, *et al.* (2000)].

Wood availability in Pakistan is highly dependent on forest wood stock and forest area. Table 1 gives an overview of forest areas in different parts of the country, with percentage contribution to the total national forests and percentage contribution to the land area.

Table 1

Forest Areas in Pakistan

Region	Khyber Pakhtunkhwa	Sindh	Punjab	FATA/ F R	Balochistan	AJK	Gilgit/ Baltistan	Islamabad	Total
Forest Area (m ha.)	1.51	0.661	0.554	0.534	0.499	0.435	0.337	0.0203	4.5
Percent of National Forest Area	33	14.5	12	11.75	10.8	10	7.5	0.45	100
Percent of Total Land Area in Forest	20.3	4.6	2.7	19.5	1.4	36.9	4.8	22.6	5.1

Source: Calculation based on data taken from Land Cover Atlas of Pakistan, PFI. 2012.

Table 2 gives the areas of State and farm forests in Pakistan. About 80 percent of the forest area is state owned forests while 18 percent is occupied by farmlands.

Table 2

Forest Area in Pakistan

Forest Area Category	Area (m hectares)
(1) Forests	3.44 (79.3% of the total forest area)
(2) Farmlands and Private Forests	0.781 (17.99% of total forest area)
(3) Others	0.119
Total	4.34 (5.01% of the land area)

Source: FAO (2009a).

III. WOOD CONSUMPTION AND WOOD SUPPLY IN PAKISTAN

Wood supplies about 30 percent of the total energy consumption in the Regional Wood Development Programme (RWEDP) in Asian member countries, which include Pakistan. In these countries, the consumption of wood is still increasing in absolute terms, even while the share of wood in national energy consumption is decreasing. Almost all countries in South and Southeast Asia are major fuel wood consumers and fuel wood producers. The total value of fuel wood is about US$ 30 billion per annum for the RWEDP countries together and some 2/3 of all fuel wood originates from non-forest land [FAO (1997a)].

The FAO (2009a) estimated that 72 percent of all wood used in Pakistan is consumed as fuel wood. The "fuel wood gap theory", formulated in the 1970s, posited that fuel wood is harvested primarily from state forests where growth rates are less than harvest rates, thus causing deforestation [FAO (1997c, 2009b, 2010)]. This gap in the

past was being used by policy makers as justification for investment in forests. But current data indicates that about 60 percent of the global fuel wood is coming from non-forest areas and these sources are enough to bridge the gap between production and consumption [FAO (1997c)]. In Pakistan in 1991, out of a total of 29.4 million tons of wood consumed, 12.6 percent was from state owned forests and 84.1 percent from other lands, while 3.3 percent was from unknown sources [FAO (1997b)]. Driving forces of fuel wood consumption are household size; urbanisation and income level; and non-availability of alternate energy sources. In Pakistan, households that have a size of 16 or higher consume 2.17 times more than household with fewer than 5 persons [Ouerghi (1993)].

Pakistan's consumption of fuel wood was estimated at 26 million m^3 in 1992, increasing to 31.52 million m^3 in 2003. The consumption of fuel wood in the commercial sector was estimated at 1.047 million m^3 [FAO (2009a)]. The household sector is the largest consumer of wood with 79 percent to 81.8 percent [Hafeez (2000); Siddiqui (2000)], followed by the industrial sector at 14.9 percent and the commercial sector at 3.3 percent. The annual wood consumption in Pakistan was estimated 43.761 million cubic meters in 2003 compared to the annual forest growth of 14.4 million cubic meters, estimated in Forestry Sector Master Plan 1992. So, there is a gap of 29.361 million cubic meters per annum between production and consumption [UNDP-PK-ECC (undated); Pakistan (2005)]. Consumption of fuel wood is highly price-inelastic in Pakistan [Burney and Akhtar (1990)].

Mathtech (1988) used per capita (0.04 m^3) annual fuel wood requirement and estimated fuel wood consumption at 56 m^3 per year per person for 2008. An area equal to 2.8 million hectares would be required to provide that volume of fuel wood for the population. This may lead to a conversion of 14 percent of cultivated area to wood plantations. Sheikh (1990) also used per capita wood consumption and estimated 30 million m^3 total consumption for the year 2000. Both studies assumed constant population growth rate and constant per capita consumption. Similarly, consumption values are used to estimate timber supply from private lands. The volume of wood supplied by private lands is generated by subtracting the state and import supply from the total consumption [Amjad and Khan (1988); Sheikh (1990); Clark (1990)].

There are three sources of wood supply in Pakistan: State forests, private farmlands and imports. State controlled forests supply only 10 percent of the fuel wood and farmlands are estimated to produce 50 percent of the timber and 90 percent of the firewood used in the country. Timber and firewood production from State forests was 0.371 million m^3 and 0.32 million m^3 respectively in 1992, declining to 63 percent and 80 percent in 2009-10. This decline was mainly attributed to the wood harvesting ban implemented in 1993 [Fischer (2010)]. Amjad and Khan (1988) estimated the farm timber availability by taking estimated per capita timber consumption of 0.0239 m^3 per capita and multiplying it by the population to arrive at national consumption. This total consumption is then subtracted from public sector production and imports. Assuming the fixed household consumption rate, the figure for timber supplied from farmlands may be 1.2 million m^3 per year. This is 51 percent of the total timber production.

During 1990's, Pakistan's North-West Frontier Province (presently called Khyber Pakhtunkhwa) was leading in timber production with 49 percent, followed by Azad

Kashmir 20 percent, Sindh 15 percent, Punjab 11 percent and Northern Areas 5 percent. Fuel wood was coming from Punjab at 53 percent, Sindh 34 percent, NWFP (present KP) 8 percent, Northern Areas 3 percent and Balochistan 2 percent and with negligible production from Kashmir [Clark (1990)].

Imports were supplying about 36 percent of the total wood used in Pakistan during the 1990's. Malaysia is the main supplier of wood to Pakistan. Imports of wood have decreased in volume, as prices have increased [Clark (1990)]. Out of the total imports, about 10 percent of the volume and 6 percent of the value is timber wood. About 91 percent of the value is pulp, paper and paperboard; the import of which has increased since 1975 [Amjad and Khan (1988)]. The imports of wood in monetary terms increased during 1992–2003 (Table 5), at an average annual increase of 0.95 percent. They accounted for 1.92 percent of the total imports of the country. Exports have shown an increasing trend from1992-1993 to 2002-2003 with a per annum average growth rate of 1.78 percent. Out of the total exports, sports goods exports make up 92 percent, followed by furniture at 4.8 percent [FAO (2009a); UNDP-PK-ECC (2010)].

According to the Wood Supply and Demand Survey, the consumption of wood in Pakistan is expected to increase to 58 million m³ by the year 2018. The wood shortage of 29.361 million m³ assumes a constant forest growth of 14.4 million m³ from state forests since 1992 [UNDP- PK-ECC (2010)]. The level of sustainable supply is below the actual consumption. The difference between the sustainable supply and the level of consumption would be considered as the annual depletion rate. It is therefore crucial to carry out an in-depth analysis of wood consumption and the sustainable production of wood, as well as the dynamics of these processes [Ouerghi (1993)].

IV. SYSTEMS DYNAMIC METHODOLOGY FOR ESTIMATING WOOD SUPPLY AND WOOD CONSUMPTION

To develop systems' methodology, a procedure has been followed: first, by developing a conceptual model (section a); designing Stella built model (section b) and the model validation (section c). After that, the results have been described with discussion and policy implications.

A conceptual diagram (Fig. 1) has been built to show the relationship among variables. These variables are: wood consumption and driving forces of wood consumption; wood supply and sources of wood supply and wood supply consumption gap. Based on Fig. (1), a Systems Model (Fig. 2) has been developed by taking key stocks and flows, namely: forest area, wood stock and population growth. The model is structured by designing five frames, Population; Wood yield; Forest area; sources of wood supply and Wood consumption to show interlinkages among the variables. After model development, the model validation is done. Validation is a process of building confidence in the usefulness of a model [Forrester and Senge (1980)]. Forrester (1968) mentioned that one cannot expect absolute validity of a model but should remember that models are developed for a purpose. He further emphasised that the model can be valid for the purpose for which it has been designed but may not be valid for some other purposes. Therefore, models may not be proved valid but may be judged as valid [Barlas and Carpenter (1990)]. The features of model validation contain its "structure" and its "behaviour" [Lane (1998); Barlas (1996); Forrester and Senge (1980)]. Barlas (1989)

highlighted some tests for validating systems' model behaviour, including comparing the trend and comparing the periods. The present study is based on trend analysis by taking past and projected periods. Two key variables, the population growth and wood consumption have been selected for our model validation. There are two reasons to select these variables, first, the problem of historic and projected data availability from official sources for rest of the variables and second, these two variables have given information and help to estimate model data on other variables, for example, wood supply from different sources (see section e. frame five). Therefore, if the source variable (wood consumption) and key driving force variable (population growth) is validated, the rest of the results would be confidently used for projection.

(a) Model Description

The conceptual diagram is as follows (Fig.1):

Fig. 1.   A Conceptual Diagram showing Forest Wood Stock and Forest Wood Consumption
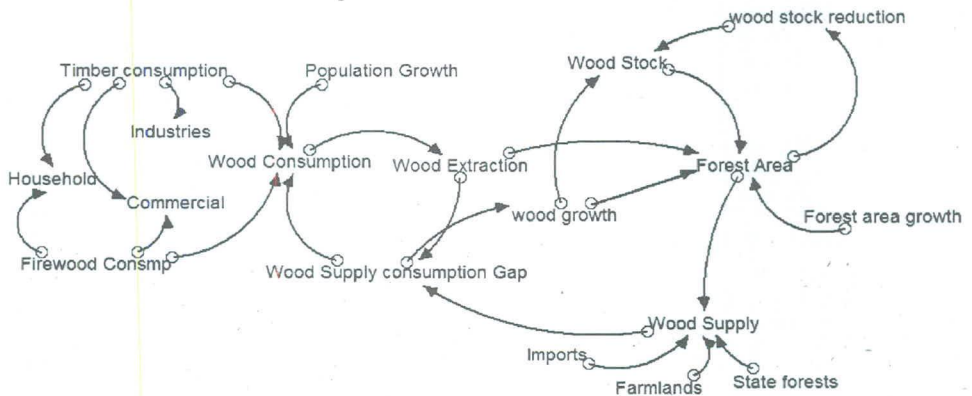
The diagram above (Fig. 1) shows the relationship and effect of the systems' components. Starting with the initial variable, wood consumption, affected by population growth leads to more wood extraction from the forests, as a result, the wood supply-consumption gap increases, unless brought about high forest growth and more area under forestation, which in the present case, is deficient. Consumption of wood that is increased because of population growth may thus be higher than wood supply. In other words, it reveals the fact that wood consumption is accelerating supply consumption gap. On the other hand, reduction in forest area through deforestation leads to greater pressure on wood stock, thus in turn putting more pressure on forest area. One balancing factor that reduces the wood supply consumption gap is the growth of the forest area. The higher the level of forest area growth, the more the forest land cover is, thus signalling that wood supply can compensate enhanced wood consumption.

(b) Computer Simulation Model

The following computer simulation model (Fig. 2) is built by using software "Stella" (version 10.1). First, the scattered information is compiled on wood supply and

wood consumption (frame five), then converting these statement's based information into formulas (model equations in Appendix) to develop time series data (model data in appendix). The time period for simulation is considered 40 years between 1990 and 2040, i.e. projecting outcomes for twenty years on the basis of the past twenty years' change in selected variables. The stocks, flows and auxiliary variables are presented in Fig. (2). The model is divided into five frames. The explanation and calculation procedure used under each frame is described as follows:

(a) Frame one representing *"Forest area"*. Forest area growth, determined with the help of Stella based sensitivity analysis, is found at the growth rate 1.1 percent. At this growth level, the forest area as calculated by the model is consistent with the national data on forest area.

(b) Frame two is displaying *"Wood Yield"*. The forest wood stock contains wood from the state owned forests and from farmlands. By combining data from Forest Department working plans, the farmland tree survey and the Household Energy Strategy Study (HESS), the Forestry Sector Master Plan mentioned a total national standing volume of wood as 368 million cubic meters in 1992 (Table 3). This data has been incorporated in our model to calculate wood supply.

Table 3

Forest Wood Stock and Yield

Year	1992
Farmland Standing Stock (mm³)	70.3
Farmland Stock Growth per Annum (mm³)	7.7
Total National Standing Stock (including Farmland) (mm³)	368
Total National Wood Yield Per Annum (mm³)	40.112

Source: Calculated on the basis of data taken from EC-FAO (Dec. 2002), wood yield per annum has been converted to mm³ on the basis of 22.2 m tones which is declared as 10.9 percent of the total standing stock.

(c) Frame three is highlighting *"People"* i.e. population growth. The present study takes into account the annual growth in population and per capita wood consumption. Some other studies also considered constant population growth and constant per capita wood consumption [Mathtech (1988); Amjad and Khan (1988); Sheikh (1990)]. Population of the country stands at 112 million for the year 1990, with average birth rate 25.4 per thousand and average death rate 7.43 per thousand [FBS (2002)]. Population is an accelerating variable for wood consumption in the country. Per capita firewood (0.2017) and per capita timber (0.046) consumption have been calculated to use it in the Stella model. Wood consumption driven by population growth is projected to the year 2040.

(d) Frame four is portraying *"Sources of wood consumption"*. Total wood consumption includes timber consumption and firewood consumption. Since time series data on timber consumption is not available, the value of firewood consumption in 1990 taken from FBS (2010) is subtracted from the total wood consumption to get timber consumption. The figures for timber and firewood consumption for years 2010-11 have been taken from Zaman and Ahmad

(2012). Based on the 1990 and 2010 figures, the time series data has been obtained for both timber and firewood consumption by using the following formula:

Rate of Change per year R= (f/s)^(1/y) - 1
Where f= final year value, s= start year value and
Y= end year to first year= 21-1=20 Thus R*100= Percentage change over the said period

(e) Frame five is displaying "*Wood Supply Sources*". Sources of wood supply are taken as wood from state forests, from farmlands and from imports. The wood supply from these sources is derived out of their share in the total wood consumption, as total national wood supply figures with respect to each source are not available. Following information, retrieved from the literature,[1] is summarised below and then converted into equations to incorporate into the Stella model:[2]

Out of the total firewood consumption, from 1990 till 1996, 10 percent of the firewood consumption was supplied by State forests. After 1996, the figure dropped to 0.91 percent because the share of farmland increased. Of the total timber consumption, from 1990 to 1995, timber consumption from state forests was 18 percent, in 1996 it became 10 percent, from 1997 and onward it was 8 percent. From 1990 to 1995 timber supply from farmlands was 41 percent, from 1996, it became 63 percent and from 1997 onward it was 72 percent of the total timber consumption. Out of the total firewood consumption, from 1990 till 1996, 90 percent of the fuel wood was supplied by farmlands and the remaining 10 percent by State forests. After 1996, the ratio changed to 99.09 percent and 0.91 percent respectively. The household sector uses 81 percent of the firewood consumption, industrial fuel wood entrepreneurs use 14.9 percent of the firewood consumption and the commercial sector consumes 3.3 percent of the firewood [FAO (2009a)]. Imports were initially 41 percent of the total timber consumption, later decreasing to 20 percent in the 2000's and then to 5 percent during 2005-2010 [FAO (2009); UNDP-ECC (2010); Clark (1990); and Pakistan (2005)].

Combining the information described in the above five frames, total wood supply; total wood consumption; supply consumption gap; total wood extraction from forests; State owned forests and farmlands; per hectare yield extraction and wood stock availability are estimated over time from 1990 to 2010 and projected to 2040. The study considers the impact of potential policy option of enhancing wood growth from farmlands on wood consumption and sustainable wood supply gap.

The abbreviated variables in the model Fig. (2) and in equations (Appendix) are explained as:

The variables; "INIT Forest area", "INIT Population" and "INIT Forest wood stock", are the initial values (values for the starting year 1990) for forest area, population and forest wood stock, respectively. "Sustainable Yield SS" represents sustainable yield supply of wood. Similarly, "Total Wood SS" stands for total

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[1]Percentage share of wood supply from each sector is calculated by taking data from FAO (2009), UNDP-ECC (2010), Clark (1990) and Pakistan (2005).
[2]See model equations on wood consumption and wood supply

wood supply. "Wood SS from state forests" and "Wood SS from Farmlands" represent data on wood supply from State Forests and from Farmlands. "Wood CC and Sustainable Gap" stands for gap between wood consumption and sustainable wood production. "Timber Fraction" is the percentage share of imported wood in the total wood consumption with respect to time. "Timber SS from State Forests" and Timber SS from Farmlands" represent variables for timber supply from State Forests and from Farmlands, respectively. Similarly, "Firewood SS from State Forests" and Firewood SS from Farmlands" represent data on firewood supply from State Forests and from Farmlands, respectively. Three other variables; "for industries", "for household" and 'for commercial use" display data on firewood consumption for these three areas.

Fig. 2. Systems Model Showing Sources of Wood Supply and Forest Wood Consumption in the Country
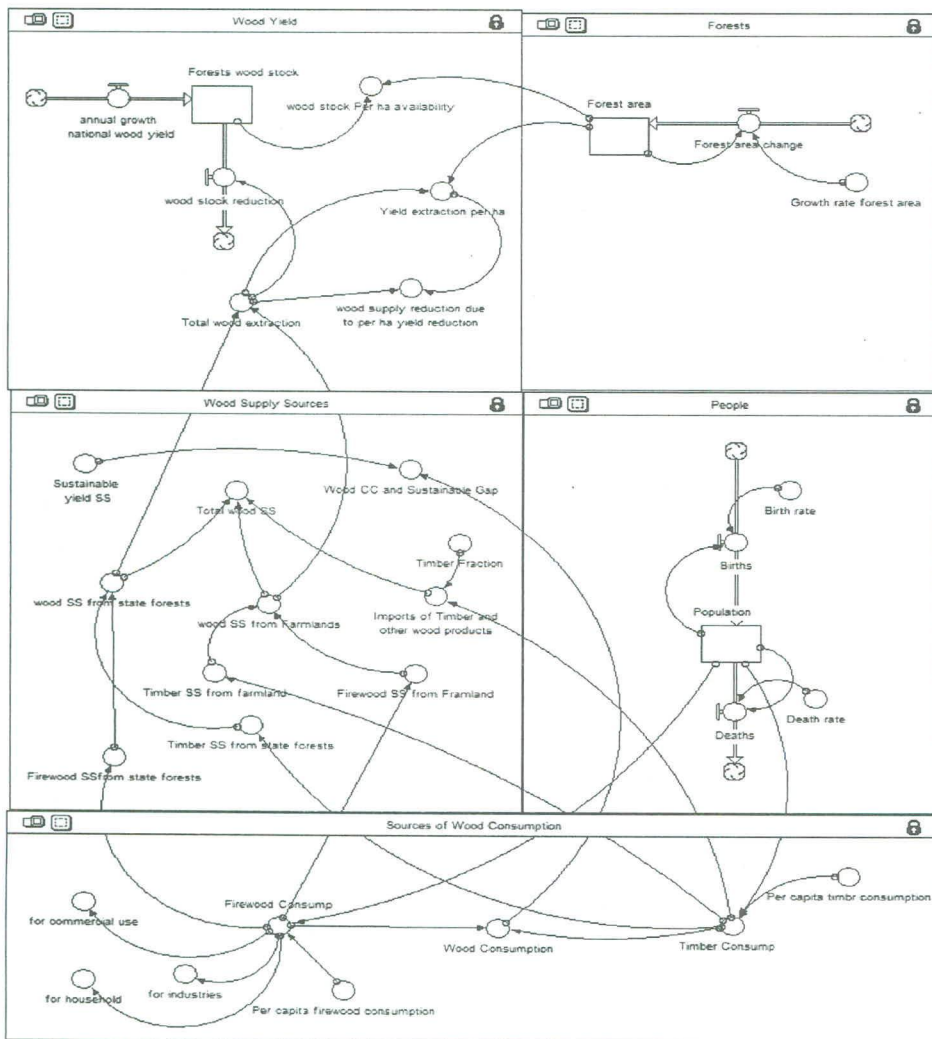
(c) Model Validation

The model was validated by comparing model projections of population and wood consumption. For the data on population, the model is validated in the light of information taken from FBS (2010) and from Zaman and Ahmad (2012). For wood consumption, the projected data is taken from Zaman and Ahmad (2012). The model data is found almost consistent with population. The model is however projecting lower wood consumption (52 million m^3) in 2025, compared to other sources (59 million m^3) for the same year (Figure 3 a, b). The data is presented in Table (4) in appendix.

Fig. 3 (a) Model Validation: Historic Trends and Projection for Wood Consumption
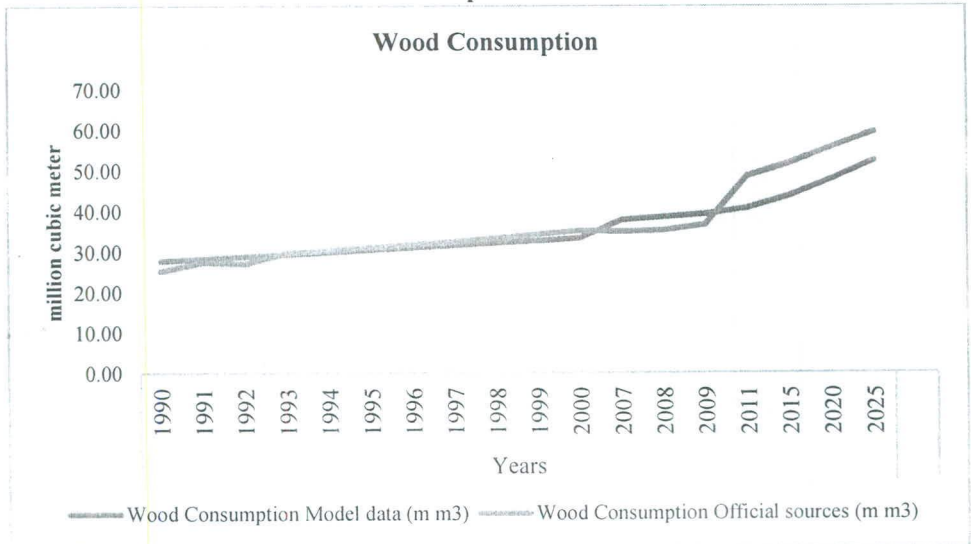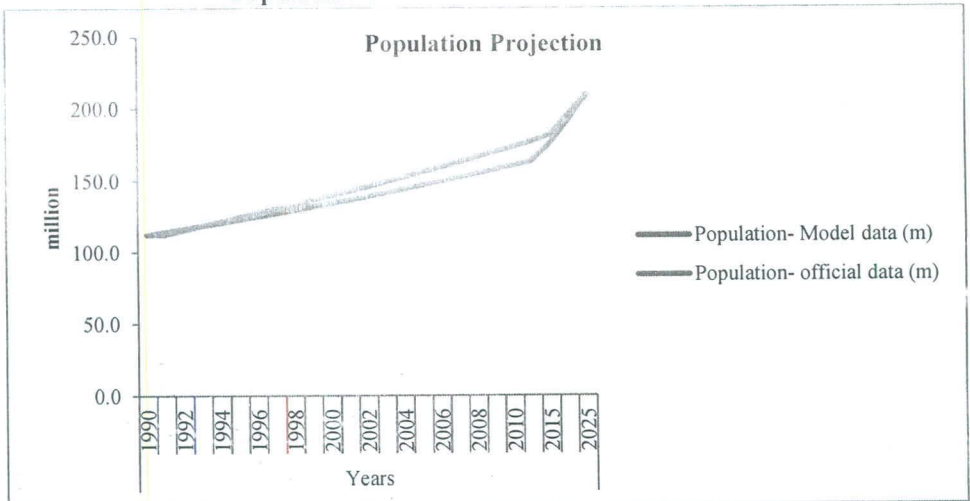

Fig. 3(b) Model Validation: Historic Trends and Projection for Population Growth

V. RESULTS

The results of the model are presented below. Detailed model output is given in Table 5 (Appendix):

Forest Area and Wood Stock

Forest area is projected to increase from 3.46 million hectares in 1990 to 5.98 million hectares in 2040. The model results show that total wood stock of 368 million m³ in 1990 is projected to reduce to 232 million m³ in 2040. The national wood growth of 40.112 million m³ per annum has been added to the wood stock. However, total wood stock has decreased over time because of the increasing pressure of wood extraction from the forests.

Wood Supply and Sources of Wood Supply

The model results show that in 1990, firewood supply from State forests and farmlands was 2.3 million m³ and 20.4 mm³ respectively. Timber supply from State forests, farmlands and imports were 0.9 mm³, 2.1 mm³ and 2.1 mm³ respectively. Total wood supply in 1990 from State forests, farmlands and imports was 3.2 mm³, 22.5 mm³ and 2.1 mm³ (Fig. 4, 5 and 6). For 2040, the projection of firewood supply from State forests and farmlands is 0.5 mm³ and 54.9 mm³. In 2040, the timber supply from State forests, farmlands and imports would be 1.0 mm³, 9.2 mm³ and 0.6 mm³ respectively. Total wood supply from farmlands would increase from 22.5 mm³ in 1990 to 64.1 mm³ in 2040, whereas wood availability from state forests would decrease from 3.2 mm³ in 1990 to 1.5 mm³ in 2040.

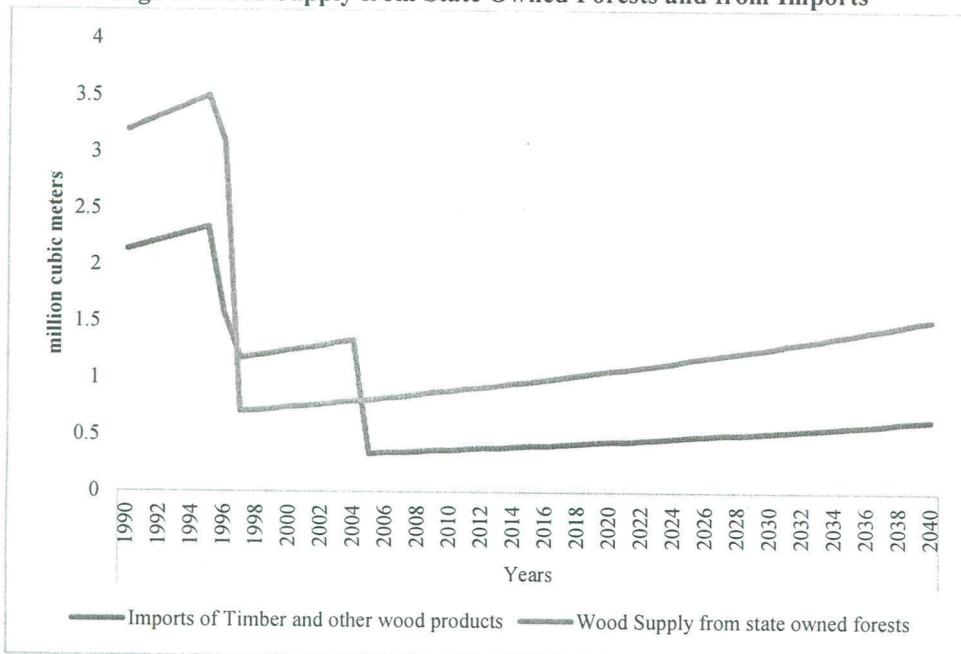**Fig. 4. Wood Supply from State Owned Forests and from Imports**

Fig. 5. Supply of Wood from Farmlands

Wood Supply from Farmlands
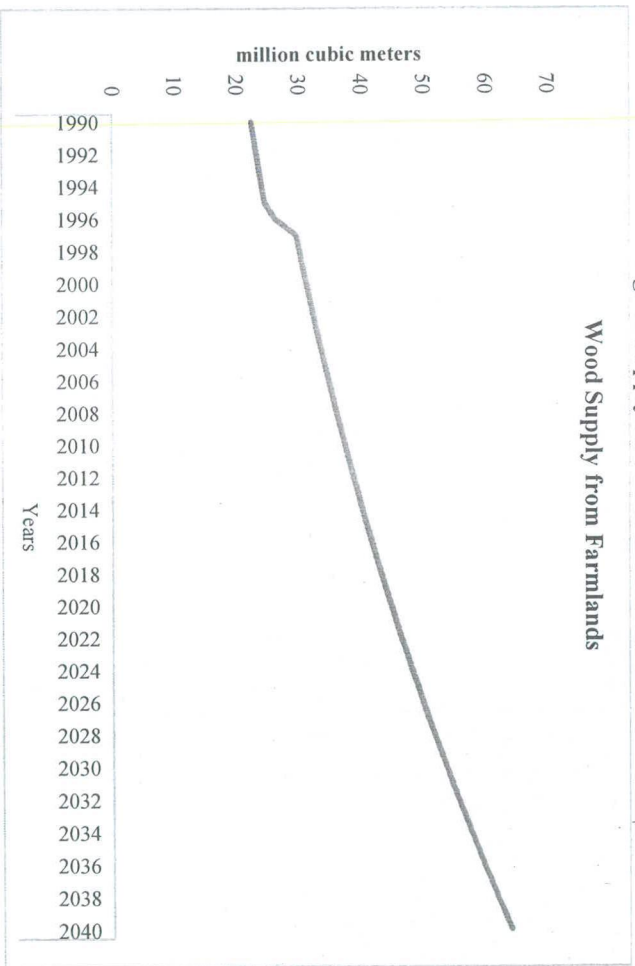
Fig. 6. Supply of Firewood from State Owned Forests and from Farmlands

Firewood Supply
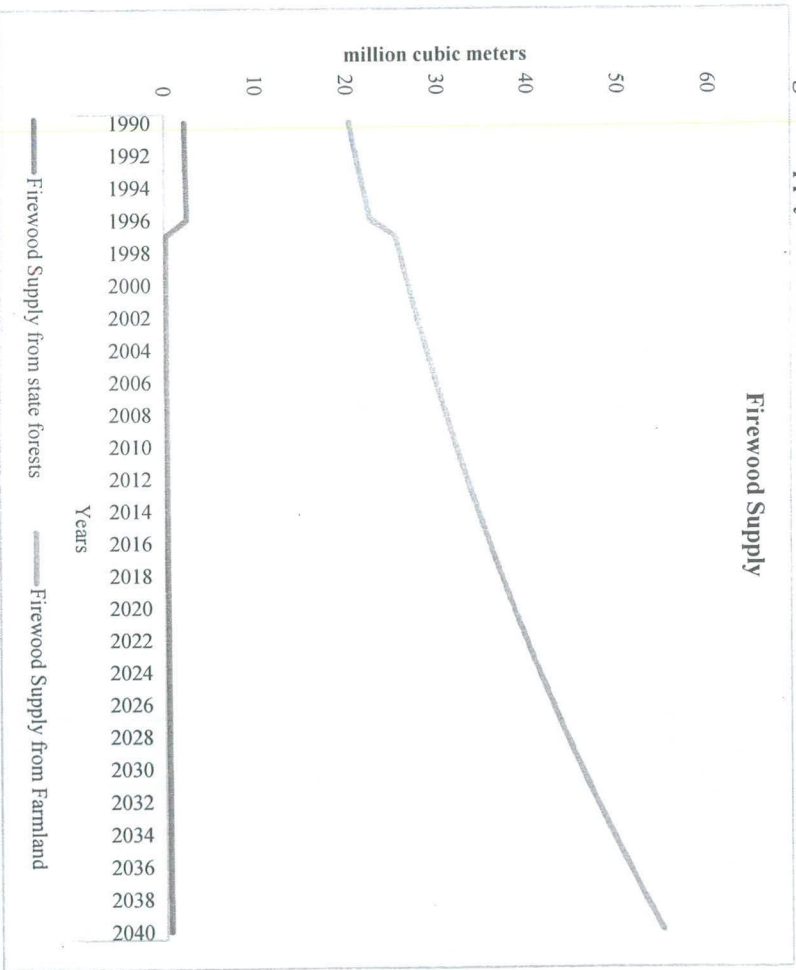
Wood Consumption Trends

The model results show that in 1990, the consumption of firewood and timber was 22.7 mm³ and 5.2 mm³, respectively. The firewood and timber consumption in 2040 would reach to 55.7 mm³ and 12.8 mm³, respectively (Fig. 7). The total wood consumption was about 27.9 mm³ in 1990 and is projected to reach about 68.6 mm³ in 2040. As the population is growing, the firewood use for households would increase over time from 18.3 mm³ in 1990 to 44.8 mm³ in 2040. For commercial use and for the industrial sector, firewood consumption would increase from 0.75 and 3.4 million m³ in 1990 to 1.84 and 8.3 million m³ in 2040, respectively.

Fig. 7. Firewood and Timber Consumption
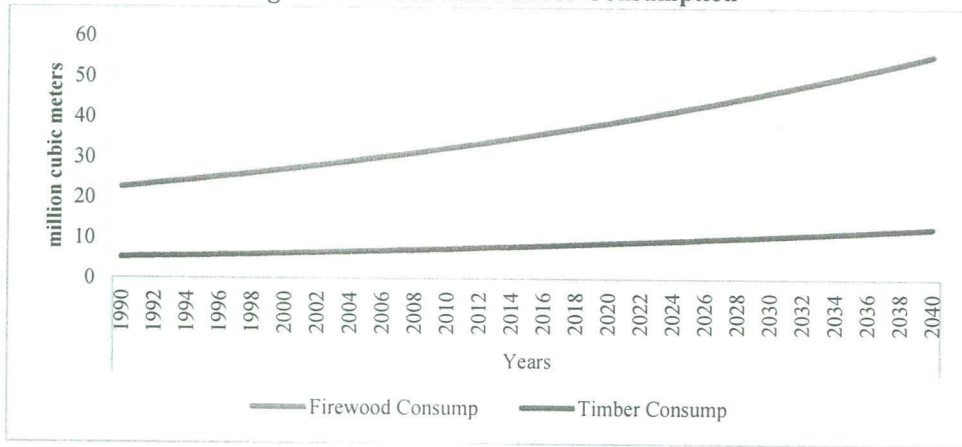
Sustainable Wood Supply and Wood Consumption

Based on the sustainable wood supply of 14.4 million m³, as estimated in forestry sector Master Plan 1992, and time series data on wood consumption, developed by the present model, the gap between sustainable wood supply and wood consumption is estimated at 13.5 million m³ in 1990, projecting to 53.8 million m³ in 2040 (Fig. 8).

Fig. 8. Gap Between Total Wood Consumption and Sustainable Wood Supply
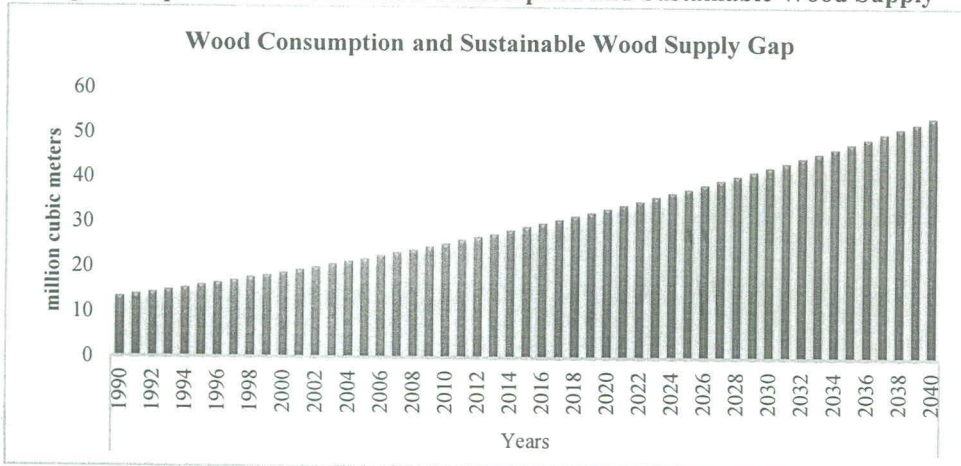
Effect of Policy Intervention

Under the present situation of energy crisis in Pakistan, consumption of wood products should not be ignored, for the population is also increasing. During financial year 2014-15, out of the total electricity generation in the country, 36.80 percent was from oil, 26.5 percent from gas, 30.40 percent from hydel, 5.4 percent from nuclear and 0.7 percent from coal [HDIP (2015)]. Electricity generation in Pakistan is dominated by thermal power plants (68 percent), running on imported oil [NEPRA (2013)]. According to State Bank of Pakistan, we imported approximately $12 b., worth of oil during 2014-15, which was 30 percent of the total import bill [PBC (2016)]. The projection shows that by 2022, total electricity production would be 53404 MW and the share of renewable sources would be only 9 percent of the total electricity production. Total demand is projected to increase at 72169 MW by 2025. About 51 Million people in the country have no access to electricity. Based on technical and economic feasibility, around 32,889 villages cannot be connected to the national grid [Khan (2016)]. Thus, it is imperative not to ignore the use of wood consumption in the country. Therefore, the sustainable wood supply should be considered. There is a need to increase sustainable wood supply.

For improving sustainable yield from the forest, in our model, we are left with two viable options: increase in forest area and increase in farmland wood growth to reduce the wood consumption-supply gap. To test this strategy, the growth of wood from farmlands was enhanced in the model to double of its present level i.e. 7.7 million cubic meters, thus the gap between wood consumption and sustainable supply would be decreased from 53.8 million m³ per year to 46 million m³. This quantity is still substantial, thus leading us to think that enhancing growth of wood from farmland will not be effective unless forest area would be increased through afforestation.

VI. DISCUSSION, CONCLUSION AND IMPLICATION OF THE STUDY

Wood supply and consumption in a country depends on several factors, forest area; wood stock availability; domestic and foreign sources of wood supply and above all population growth. With growing population and shortage of electricity and gas in Pakistan, consumption of wood especially fuel wood has increased over time. There are three sources of wood supply: state owned forests, farmlands and imports. During 1990-2010, the share of state owned forest in total wood supply decreased from 11.5 percent to 2.3 percent, whereas the share of farmlands in total wood supply increased from 80.8 percent to 96.7 percent during the same period. The imports of wood have decreased over time, thus putting more pressure on domestic forests; both state owned forests and farmlands. The wood extraction from domestic forests increased over time; the pressure is more for firewood than timber. Out of the total wood consumption, the share of firewood consumption was 81.3 percent whereas the share of timber was 18.7 percent. For firewood, the state-owned forests contributed 10 percent while the contribution of farmlands remained 90 percent in the total firewood supply. With the passage of time the share of state owned forests in firewood supply further decreased to less than .1 percent while the share of farmlands increased to 99.1 percent. The demand for firewood is highest from the household sector, followed by the industrial sector and commercial use. Other studies are highlighting that the main use of wood in forest rich areas especially in

Hazara and Swat by local people is for cooking, followed by wood use for construction and for fodder. Local population typically does not engage in large scale wood cutting for commercial purposes [Nazir (2009); Ali (2004); Ali, *et al.* (2006)].

Like fuel wood supply trends, timber supply from state forests has decreased from 18 percent to less than 10 percent while the share of farmlands has increased from about 41 percent to 84 percent, while wood extraction was increasing from domestic forests, created negative pressure on wood stock. Wood yield extraction per hectare would increase from 7.4 cubic meters in 1990 to 10.9 cubic meters in 2040, thus resulting in a decline in wood stock availability over time. It is estimated that wood extraction from domestic forests will surpass annual national wood yield growth (40.112 million m^3) in 2018. Sustainable supply of wood is estimated at 14.4 million m^3 annually in Pakistan [Pakistan (1992); UNDP-ECC (undated); Pakistan (2005)]. The results of the present study estimated that the gap between sustainable wood supply and wood consumption increased over time in the country, thus reaching the conclusion that unsustainable wood extraction from domestic forests increased from 11 million m^3 in 1990 to 51 million m^3 in 2040.

The research on forestry issues in Pakistan shows that a large part of the population depends on wood, as fuel source and for construction [Ali, Tanvir, and Suleri (2006)]. Since the alternate energy sources are either not available to large part of the population or are expensive, main stress is on wood sources. This is also aggravating illegal cutting and timber smuggling from national forests in Pakistan [UNOCD and SDPI (2011)]. Further, studies show that the insufficient data availability is a hindrance in the way of forest product analysis [see for example, Ouerghi (1993); Khalil (2000)]. The present study is designed with the aim to estimate data on key forestry variables under the assumption that, in the absence of sufficient alternate energy supply, if the present rate of wood consumption is continued, there would be high demand in future, as the population is increasing, thus increasing consumption and the supply gap. Other studies are also projecting high wood consumption in the country [see for example, UNDP- PK-ECC (undated)]. Fisher, *et al.* (2010) also mentioned that the demand supply gap may increase to 13.6 million m^3 by 2050. High demand supply gap may result in depleting and disappearance of forest areas of Malakund and Hazara by 2027 [Joachim (2000)]. Siddiqui and Amjad (1993) also mentioned that the reliance on wood is expected to remain high in Pakistan in the foreseeable future. Since land conversion is also going on. There is a need to take substantial steps to meet the needs of the local communities. Nazir and Ahmad (2016) estimated long term land use conversion trends in Pakistan and found that if the present rate of land conversion would not be checked, an area equal to 0.0536 m. ha would be converted to construction area, rangeland area and agriculture land by 2030. Controlling deforestation is not the only strategy, as estimated by Nazir and Ahmad (2016) but efforts should be made to increase sustainable wood supply and to provide alternative energy sources in the country. The area under forest has also been estimated in the present study. The forest area of Pakistan is low by international standards. Forest area is projected to increase only to 5.4 million hectares in 2040 from 3.4 million hectares in 1990. The growth seems to be very slow because of high deforestation in Pakistan and low rate of afforestation and regeneration. Velle (1998) mentioned that in 1998, normal regeneration was observed only in 5.5 percent of the

forest area, some regeneration in 24 percent of the area, while no regeneration was observed in 70.5 percent of the area. At global level, programmes have been launched to increase forest area by planting billion trees [UNEP (2011)]. The present KP government has also taken an initiative under its programme "Billion Tree Tsunami Afforestation Project" (BTTAP), to plant one billion trees to meet the demand of wood for the local communities and to increase forest area to 2 percent [Govt. of KP (2015)]. This project emphasised the participation of local communities and plantation on farmlands. The present study suggested that increasing wood supply from farmlands might ease some pressure on forests but would still not solve the problem totally. Rauf (1994) also emphasised the need of agro-forestry to meet Pakistan's fuel wood needs. Ayaz and Wani (2000) mentioned that the major contributors in the national wood supply were farmlands. The prospects of farm forestry are evident in the HESS wood demand survey, which indicated that during 1990-91 around 125 million trees were planted and the share of non-fruit trees was almost 90 percent. The largest proportion of the planted trees (44.9 percent) was for timber, where 29.8 percent was destined for fuel purposes, with the remainder being planted for fruits, shade, fodder and other purposes [Ouerghi (1993)].

For the proper management of forests in a country, it is necessary to estimate the present and projected forest resources. The consumption and supply of wood resources is one of the main areas that needs proper planning. Methodology that incorporates systems' components and its changing trends, to estimate natural resource variables, gives us a detailed picture of a problem. System dynamics methodology also helps to generate data for variables for which there is insufficient information available. Pakistan's forestry sector also suffers from data deficiency. The present case study of building a systems' model by developing causal relations and feedback loops of data with information gaps helped us to develop time series data of wood supply and consumption in Pakistan. Research based on case studies help to replicate the model for other similar settings.

In developing countries, the underlying driving force for wood consumption is population growth. The growing population in Pakistan is resulting in an increasing demand for forest products. The main area of concern is firewood use; particularly by households. There is a limited room for growth in wood supply from State forests as there is no significant increase in forest area. Imports of wood, being expensive, are declining. It is pertinent to focus on increasing sustainable wood by focusing on farmland growth and afforestation in the country.

Model estimated data on key variables, such as: national wood stock; timber supply from farmlands and from state forests (mm^3); firewood supply from farmlands and from state forests (mm^3); imports of wood products (mm^3) and projected wood supply consumption gap, is a valuable addition to the literature of forestry of Pakistan. The results of the study can be used to estimate other variables and address other issues in the field. For example, the targets set under Billion Tree Tsunami Project and projected change after the inclusion of the project in the existing growth is to calculate sustainable wood availability in the country and estimating change in the volume of wood stock and wood consumption etc. By using demand supply gap, this study would be helpful in estimating the illegal wood harvest in the country.

APPENDIX

Model Equations and Supporting Data

Variables	Data and Equations
Forest area (t)	Forest area (t - dt) + (Forest area change) * dt
INIT Forest area	3460000 hectares
INIT Forests wood stock	368000000 m^3
Growth rate forest area	1.1%
INIT Population	112270000
Birth rate	25.45
Death rate	7.4
Annual growth national wood yield	40112000
Sustainable yield SS	14400000
Per capita firewood consumption	0.201754698 m^3
Average Per capita timber consumption	0.046429402 m^3
Firewood Consumption	Per capita firewood consumption*Population
Firewood from Farmland	IF TIME<=1996THEN.90*Firewood Consumption ELSE 0.9909*Firewood Consumption
Firewood from state forests	If time < = 1996 then 0 .1 *Firewoo⌐ Consumption else 0.0091* Firewoou Consumption
Firewood for commercial use	0.033*Firewood Consumption
Firewood for household	0.81*Firewood Consumption
Firewood for industries	0.149*Firewood Consumption
Imports of Timber, other wood	Timber Consumption *Timber Fraction Timber Fraction
GRAPH (TIME)	Timber Fraction = 0.41 (1990-1995), 0. 27 (1996), 0. 20 (1997-2004), 0.05 (2005-10)
Supply from Farmlands	Firewood from Farmland +Timber from farmland
Timber from Farmland	IF TIME > = 1990 AND TIME <= 1995 then 0.41*Timber Consumption
ELSE	IF TIME =1996 then 0.63*Timber Consumption ELSE 0.72*Timber Consumption
Timber from State forests	IF TIME > = 1990 AND TIME <= 1995 then 0.18*Timber Consumption
ELSE	IF TIME = 1996 then 0.10*Timber Consumption ELSE 0.08*Timber consumption
Forests wood stock (t)	Forests wood stock (t - dt) + (annual growth national wood yield – wood stock reduction) * dt
Wood stock reduction	Total wood extraction
Total wood extraction	Wood SS from state forests + wood SS from Farmlands
Total wood SS	wood SS from state forests + Imports of Timber and other wood products + wood SS from Farmlands
Wood CC and Sustainable Gap	Wood Consumption-Sustainable yield SS
Wood stock per ha availability	Forests wood stock/Forest area
Yield extraction per ha	Total wood extraction/Forest area

Table 4

Model Validation for Wood Consumption and Population

Years	Model Data* Wood Consumption (million m³)	Official Data Wood Consumption (million m³)	Model Data* Population (m.)	Official Data Population (m.)
1990	27.86	25.38	112.3	112.27
1991	28.37	27.523	114.3	112.61
1992	28.89	27.08	116.4	115.54
1993	29.41	29.815	118.5	118.5
1994	29.94	30.53	120.6	121.48
1995	30.49	31.243	122.8	124.49
1996	31.04	31.955	125	127.51
1997	31.61	32.576	127.2	130.56
1998	32.18	33.425	129.5	132.25
1999	32.77	34.298	131.9	136.69
2000	33.36	35.192	134.3	139.96
2007	37.84	34.98	152.2	162.91
2008	38.53	35.274	154.9	166.41
2009	39.23	36.615	157.7	169.94
2011	40.67	48.52	163.5	177.1
2015	43.71	51.71	175.6	181.74
2020	47.83	55.64	192	195.49
2025	52.33	59.44	210	208.84

Source: Federal Bureau of Statistics (2011-12). Zaman and Ahmad (2012).
    * Results of the model.

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Table 5

Model Data Showing Wood Stock, Wood Supply and Wood Consumption in the Country (million m³)

Years	Forests wood stock	Firewood Supply from state owned forests	Firewood Supply from Farmland	Imports of Timber & wood products	Timber Supply from farmland	Timber Supply from state owned forests	Wood Supply from Farmlands	Wood Supply from state owned forests	Total wood Supply	Fire wood Consumption	Timber Consumption	Wood Consumption
1990	368	2.27	20.39	2.14	2.14	0.94	22.52	3.2	27.86	22.65	5.21	27.86
1991	382.4	2.31	20.75	2.18	2.18	0.96	22.93	3.26	28.37	23.06	5.31	28.37
1992	396.3	2.35	21.13	2.22	2.22	0.97	23.34	3.32	28.88	23.48	5.4	28.88
1993	409.8	2.39	21.51	2.26	2.26	0.99	23.76	3.38	29.4	23.9	5.5	29.4
1994	422.7	2.43	21.9	2.3	2.3	1.01	24.19	3.44	29.93	24.33	5.6	29.93
1995	435.2	2.48	22.29	2.34	2.34	1.03	24.63	3.5	30.47	24.77	5.7	30.47
1996	447.2	2.52	22.7	1.57	3.66	0.58	26.35	3.1	31.02	25.22	5.8	31.02
1997	457.8	0.23	25.44	1.18	4.25	0.47	29.69	0.71	31.58	25.67	5.91	31.58
1998	467.5	0.24	25.9	1.2	4.33	0.48	30.23	0.72	32.15	26.14	6.01	32.15
1999	476.7	0.24	26.37	1.22	4.41	0.49	30.77	0.73	32.73	26.61	6.12	32.73
2000	485.3	0.25	26.84	1.25	4.49	0.5	31.33	0.75	33.32	27.09	6.23	33.32
2001	493.4	0.25	27.33	1.27	4.57	0.51	31.9	0.76	33.92	27.58	6.35	33.92
2002	500.8	0.26	27.82	1.29	4.65	0.52	32.47	0.77	34.54	28.07	6.46	34.54
2003	507.7	0.26	28.32	1.32	4.74	0.53	33.06	0.79	35.16	28.58	6.58	35.16
2004	514	0.26	28.83	1.34	4.82	0.54	33.65	0.8	35.79	29.1	6.7	35.79
2005	519.6	0.27	29.35	0.34	4.91	0.55	34.26	0.81	35.42	29.62	6.82	36.44
2006	524.6	0.27	29.88	0.35	5	0.56	34.88	0.83	36.06	30.16	6.94	37.1
2007	529	0.28	30.42	0.35	5.09	0.57	35.51	0.84	36.71	30.7	7.07	37.77
2008	532.8	0.28	30.97	0.36	5.18	0.58	36.15	0.86	37.37	31.26	7.19	38.45
2009	535.9	0.29	31.53	0.37	5.27	0.59	36.8	0.88	38.04	31.82	7.32	39.14
2010	538.3	0.29	32.1	0.37	5.37	0.6	37.47	0.89	38.73	32.39	7.45	39.85
2011	540.1	0.3	32.68	0.38	5.46	0.61	38.14	0.91	39.43	32.98	7.59	40.57
2012	541.2	0.31	33.27	0.39	5.56	0.62	38.83	0.92	40.14	33.57	7.73	41.3
2013	541.5	0.31	33.87	0.39	5.66	0.63	39.53	0.94	40.87	34.18	7.87	42.05
2014	541.2	0.32	34.48	0.4	5.77	0.64	40.25	0.96	41.6	34.8	8.01	42.81
2015	540.1	0.32	35.1	0.41	5.87	0.65	40.97	0.97	42.35	35.43	8.15	43.58
2016	538.2	0.33	35.74	0.41	5.98	0.66	41.71	0.99	43.12	36.06	8.3	44.36
2017	535.6	0.33	36.38	0.42	6.08	0.68	42.47	1.01	43.9	36.72	8.45	45.17
2018	532.3	0.34	37.04	0.43	6.19	0.69	43.23	1.03	44.69	37.38	8.6	45.98
2019	528.1	0.35	37.71	0.44	6.31	0.7	44.01	1.05	45.5	38.05	8.76	46.81
2020	523.2	0.35	38.39	0.45	6.42	0.71	44.81	1.07	46.32	38.74	8.92	47.66
2021	517.4	0.36	39.08	0.45	6.53	0.73	45.62	1.08	47.15	39.44	9.08	48.52
2022	510.8	0.37	39.79	0.46	6.65	0.74	46.44	1.1	48.01	40.15	9.24	49.39
2023	503.4	0.37	40.5	0.47	6.77	0.75	47.28	1.12	48.87	40.88	9.41	50.28
2024	495.1	0.38	41.24	0.48	6.9	0.77	48.13	1.14	49.75	41.61	9.58	51.19
2025	485.9	0.39	41.98	0.49	7.02	0.78	49	1.17	50.65	42.36	9.75	52.11
2026	475.9	0.39	42.74	0.5	7.15	0.79	49.88	1.19	51.57	43.13	9.93	53.05
2027	464.9	0.4	43.51	0.51	7.28	0.81	50.78	1.21	52.5	43.91	10.1	54.01
2028	453.1	0.41	44.29	0.51	7.41	0.82	51.7	1.23	53.44	44.7	10.29	54.99
2029	440.2	0.41	45.09	0.52	7.54	0.84	52.63	1.25	54.41	45.51	10.47	55.98
2030	426.5	0.42	45.91	0.53	7.68	0.85	53.58	1.27	55.39	46.33	10.66	56.99
2031	411.7	0.43	46.74	0.54	7.81	0.87	54.55	1.3	56.39	47.17	10.85	58.02
2032	396	0.44	47.58	0.55	7.96	0.88	55.54	1.32	57.41	48.02	11.05	59.07
2033	379.2	0.44	48.44	0.56	8.1	0.9	56.54	1.34	58.45	48.88	11.25	60.13
2034	361.5	0.45	49.31	0.57	8.25	0.92	57.56	1.37	59.5	49.77	11.45	61.22
2035	342.6	0.46	50.2	0.58	8.39	0.93	58.6	1.39	60.57	50.66	11.66	62.32
2036	322.8	0.47	51.11	0.59	8.55	0.95	59.65	1.42	61.67	51.58	11.87	63.45
2037	301.8	0.48	52.03	0.6	8.7	0.97	60.73	1.44	62.78	52.51	12.08	64.59
2038	279.7	0.49	52.97	0.62	8.86	0.98	61.83	1.47	63.91	53.46	12.3	65.76
2039	256.6	0.5	53.93	0.63	9.02	1	62.94	1.5	65.07	54.42	12.52	66.95
2040	232.2	0.5	54.9	0.64	9.18	1.02	64.08	1.52	66.24	55.4	12.75	68.15

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Economic Contribution of Copyright-based Industries in Pakistan

GHULAM SAMAD, VAQAR AHMED, and RAUF KHALID

The copyright-based industries contribute substantially to the national economy in the form of value addition, tax revenues, trade and employment. This study highlights both the core and non-core copyright-based industries in Pakistan. With the technical guidance of World Intellectual Property Organisation (WIPO) and National Institute of Cultural Studies (NICS), we conducted the first ever survey of the copyright-based industries in Pakistan. The estimates of contribution to GDP, tax revenues, trade and employment were also validated through focus group discussions and key informant interviews. Our findings reveal that copyright-based industries contributed Rs 136 billion to GDP (on 1999-2000 base year prices of Pakistan Bureau of Statistics). These industries also contributed Rs 18 billion to the government in indirect taxes. On the trade side, the exports of these industries totalled $ 943 million and imports amounted to $2130 million in 2007-08. In terms of job creation one of the core sub-sectors i.e. electronic media employed around 47,000 persons by the end of 2011.

JEL Classification: O34, F10, E24
Keywords: Copyright, Economic Growth, Trade and Employment

1. INTRODUCTION

Trade Related Intellectual Property Rights (TRIPS) are one of the milestone achievements of the World Trade Organisation (WTO). The most significant development of the Uruguay Round of Trade Negotiations (1986-94) was the inclusion of intellectual property rights (IPRs) issue on the agenda of the multilateral trading system. Before the TRIPS agreement, this issue was regulated by Paris Agreement (1863), Berne Convention (1886), Madrid Agreement (1891), Universal Copyright Convention (1952), Rome Convention (1961), Geneva Convention (1971) and IPIC Treaty (1989) [Bagchi (2007)]. The agreement has five important components, namely: patents, trademarks, copyrights, geographical indications and industrial designs.[1]

[1]Defined in Annex-I. The various types of copyright-based industries are also given in Annex-I.

TRIPS had opened a new avenue for countries wishing to pursue comparative advantages in copyright-based industries. WIPO (2003) categorised the copyright-based industries into four types i.e. core, interdependent, partial and non-dedicated support industries. The enterprises, which are entirely employed in the creation, production, manufacturing, performance, broadcasting and communications, are core copyright-based industries. This includes press and literature, music, theatrical production and opera, motion pictures and videos, radio and television, photography, software and databases, visual and graphic arts and advertising services.

The interdependent copyright industries are those industries, which have equipment or activities related to copyright industries like TV sets, Radios, VCRs, CD players, DVD players, cassette players, electronic game equipment, computers and musical instruments. The partial copyright industries are those in which activities and production depend on the activities and materials protected by copyright and neighbouring rights e.g. textile, leather and footwear, wood, metal crafts, sports, jewellery. Finally, the non-dedicated copyright industries provide support to the copyright industries e.g. transportation, telephony and general retailing.

The protection of copyright industries is now gaining importance in national regulations; therefore WIPO is concerned to find their economic contribution in the form of trade, employment and GDP contribution. In this regard the pioneering work was done by Arnold (1934), published in a book Economica.[2] After 1970s several countries including Canada, Sweden, USA, New Zealand, Germany, the United Kingdom, Holland, Austria, Finland, Japan, Argentina, Chile, Brazil, Paraguay and Uruguay have conducted studies using their own methodologies and classifications to a large extent. More recently a number of countries like the Philippines, Mexico, Jamaica, Bulgaria, Lebanon and Singapore followed WIPO (2003), which harmonises the methodology for assessing the economic contribution of copyright industries.

It will be pertinent to mention here a few of the recent efforts in this area. Pickard and Toivonen (2000) used Gross Value Addition to GDP as an economic indicator to measure the contribution of copyright-based industries, and it also presents share of the total employment and value of the foreign trade in copyright-based industry. ACG (2001) measured the economic contribution of copyright industries using industry value added (IVA).[3] State University of Campinas and WIPO (2002)[4] conducted a study on economic importance of industries and activities, protected by copyright and related rights in MERCOSUR (Argentina, Brazil, Paraguay and Uruguay) and Chile using the share in GDP, employment and foreign trade. For estimating the economic contribution of the copyright based sector in Netherlands, Tueeuwes (2004) used the same methodology. The author estimated value addition, job creation in copyright based industries, exports and imports. Canadian Heritage (2006) used value addition to measure economic contribution. In addition it examined employment and trade levels (with the shortcoming of not considering services contribution in total exports like exhibition rights) and provided comparisons with respect to other industries (agriculture, accommodation and food services, utilities etc.). In most of the above studies both the secondary and primary data collection has been carried out.

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[2]New series of the books "Economica" 1(2):167-195
[3]IVA is the net contribution of an industry to GDP after deducting the cost of raw materials, fuel, power and other purchases.
[4]http://www.wipo.int/edocs/pubdocs/en/copyright/889/wipo_pub_889_1.pdf

The methodology which has been used in this study is borrowed from UN-WIPO. We have used the methodology defined/developed by UN-WIPO. Every country study is using the same methodology; therefore, there is no disagreement about the usefulness of this methodology. Unfortunately, the critical review of this existed methodology is also not available.

Despite respectable macroeconomic performance of Pakistan (Table 1), intellectual property (IP) enforcement situation in Pakistan is very weak, that in turn curtails the growth of creative entrepreneurs and foreign investment. Even a decade ago (in 2001), International Intellectual Property Alliance (IIPA) filed a petition, and questioned Pakistan's eligibility for preferential duty free treatment, under the generalised system of preferences (GSP) program due to their concern about piracy in books and software.[5] Simultaneously they also blamed Pakistan for export of these pirated discs (this is obsolete stuff now), which are costing their economy hugely; therefore, they are uncomfortable with the weak IP situation in Pakistan. The existing weak IP situation in Pakistan is resulting in gradual lowering of intellectual activities that make it to mainstream production processes. This has implied brain drain of intellectual and creative workforce over the long run, which in turn means low future export receipts and weak prospects for foreign direct investments Ahmed, *et al.* (2010).

Table 1

Macroeconomic Performance of Pakistan 1960s – 2000s

Indicators	1960s	1970s	1980s	1990s	2000s
Economic Growth					
GDP	6.8	4.8	6.5	4.6	4.8
Agriculture	5.1	2.4	5.4	4.4	3.2
Manufacturing	9.9	5.5	8.2	4.8	7.0
Services	6.7	6.3	6.7	4.6	5.3
Government Revenue to GDP Ratio	13.1	16.8	17.3	17.1	14.2
Government Expenditure to GDP Ratio	11.6	21.5	24.9	24.1	18.7
Fiscal Balance to GDP Ratio	1.5	−4.7	−7.6	−7.0	−4.5
Consumer Price Index (% Growth)	3.2	12.5	7.2	9.7	7.7
Exports (% Growth)	–	13.5	8.5	5.6	9.9
Imports (% Growth)	–	16.6	4.5	3.2	13.7
Current Account Deficit (% of GDP)	–	–	3.9	4.5	1.5

Source: Pakistan Economic Survey 2010-11.

It is the weak enforcement of IP laws over time that has also curtailed the growth of creative businesses in Pakistan. The Business Software Alliance (BSA) showed in 2008 that a 10 percent reduction in computer software piracy would deliver 11,700 new jobs, $23 million in tax revenue and additional $160 million in economic growth of Pakistan [BSA (2008)].

In order to address these issues the government created Intellectual Property Organisation (IPO) in 2005 with the support of WIPO. The IPO Pakistan greatly revised and brought reforms in IP management, like empowering the Federal Investigation

[5]Particularly for textbooks.

Agency (FIA), activating Pakistan Customs and bringing all their office operations under one window. The present IPO Pakistan is one of the few organisations in the world which are integrated with the FIA and the Customs departments.[6] However, this organisation still faces challenges in the form of improvement in the expertise of the IP laws; preparation for access to Madrid Protocol and Patent Cooperation Treaty; aligning IP laws with IPO Pakistan Ordinance; establishment of technology incubation centres and technology licenses offices.

The next section explains in detail the methodology used and data sources. Section 3 provides the estimated results and Section 4 concludes with policy recommendations.

2. DATA AND METHODOLOGY

Our key source of data on value addition of the core and non-core copyright sectors is the Pakistan Bureau of Statistics (PBS) supply and use tables which were updated for 2007-08.[7] State Bank of Pakistan (SBP)[8] made the disaggregated data on export and import available for this study. Data on employment has been taken from both the primary and secondary sources. For primary sources, questionnaires were developed and sent to copyright relevant industries and associations for primary level information. For secondary sources, the Labour Force Survey and Census of Manufacturing Industries were used. With the technical guidance of WIPO and leading role of the National Institute of Cultural Studies, Islamabad, we conducted the first ever survey of the copyright and related Rights Industries in Pakistan. For policy issues, labour market reforms and related matters we conducted focus group discussions and key informant interviews.

The questionnaire was initially sent to producer and trade associations. These include Pakistan Handicrafts (25 registered firms), Associated Press of Pakistan (APP, 243 registered firm), Pakistan Association of Printing and Graphic Arts Industry (PAPGAI, 594 registered firm), Pakistan Electronic Media Regulatory Authority (PEMRA, 2400 registered firms), Pakistan Film Producers Association (PFPA, 376 registered firms), Pakistan Advertising Association (PAA, 90 registered firms) and Photographic Society of Pakistan (PSP, 70 registered firms). Similarly, to validate the questionnaire information and overcome the low response rate we interviewed the heads of these institutions, including the Pakistan Bureau of Statistics (PBS), Federal Board of Revenue (FBR) and the State Bank of Pakistan (SBP). Moreover, we conducted the focus group discussions with the executive bodies of the above mentioned organisations.

Using data from Federal Board of Revenue, another effort was made to consolidate the contribution of copyright-based industries in Pakistan towards overall tax revenues. It has been easier to get a one-point estimate for net indirect taxes (i.e. indirect taxes minus subsidies) from the 1999-2000 supply use tables; however, for the years beyond 2000 and for detailed tax classification, the team contacted Pakistan Revenue Automation Ltd. which is a data warehouse arm of Federal Bureau of Revenue. Monthly statistics were available on sectoral and client-wise sales tax receipts. However, information on corporate and personal income tax was not provided due to data security protocols.

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[6]IPO Pakistan Annual Report, 2008-09.
[7]Input-out tables (2008) from Pakistan Bureau of Statistics.
[8]Multiple reports (2007-08) on exports and imports.

In Pakistan sales tax is a single levy tax on total sale (consumer price) of goods or services and is levy-able on copyright based industries too. The data was up to date and it was also possible for us to calculate an estimate of tax evasion in copyright-based industries.

Once our primary information was complied, an important step was the mapping of WIPO categories with classifications currently followed by Pakistan (i.e. International Standard Industrial Classification ISIC-rv.3.1).[9] However, such mapping involves estimation and segregation by 'copyright factors', which are explained below.

Estimation of 'Copyright Factors'

It is difficult to eliminate the elements that cannot be fully attributed to copyright.[10] As a starting point we benefited from Boey and Mun (2005), who derived the copyright content factors using methodology from Watt (2004). Both studies use the guidelines framed by WIPO.

In order to make copyright factors country-specific we referred to the productivity estimates, provided by the industry or association members/experts during our consultative sessions (Table 2). Studies such as Kemal (1993) and Kemal, *et al.* (2003) provide some help in organising the industries in terms of their relative creative content. Other methodologies include Kwan (2002) who proposed the estimation of "sophistication index" for exported goods, where the sophistication of product equals weighted average of the exporting country's per capita GDP.

The biggest challenge in establishing the copyright factor is how to eliminate elements that are not fully attributed to copyright. It was a challenging task to establish how to measure and asses exactly, if a copyright component exists in a product. The WIPO guide (2003) explains this as a problem of inclusiveness and exclusiveness. To reduce these uncertainties to an acceptable minimum, we first categorise industries in Pakistan into core copyright, interdependent, partial and non-dedicated copyright based industries. According to the WIPO guide (2003), the core and interdependent copyright-based industries have 100 copyright factors, because in these industries all of the components are 100 percent attributed to copyright. It was difficult to exactly assign copyright factors to partial and non-dedicated industries. We conducted key informant interviews with the expert in related fields to try to assign the values, which are acceptable to the experts. These values are subjective and might vary but we, at all stages, took guidance from WIPO experts and national experts to measure adequately the proportion of the copyright-based component of an industry.

The copyright factors mentioned above have been validated in the light of WIPO guidelines and published literature from other countries. It is expected as a consequence of this study that IPO Pakistan will conduct sector specific studies in order to refine the estimates of copyright content factors.

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[9]See Annex II.
[10]WIPO Guide on Surveying the Economic Contribution of Copyright-Based Industries, Geneva 2003.

Table 2

Copyright Factors

Sector ID[11]	Activities	Copyright Factor (%)
	Core Copyright Industries	
70	Newspaper and printing	100
149	Data processing and IT	100
151	Social and cultural services	100
154	Recreation services	100
155	Radio and TV broadcasts	100
	Interdependent Copyright Industries	
69	Manufacturing of Paper and paper products	100
112	Manufactruring of Musical instrument	100
	Partial Copyright Industries	
59	Art silk	5
61	Made up textiles	5
62	Knitwear	3
63	Carpets	3.5
64	Garments	3
65	Leather and footwear	25
67	Wood and wood products	10
68	Wooden furniture	20
109	Handicrafts	70
110	Sports goods	10
111	Jewelery	25
	Non Dedicated Copyright Industries	
131	Wholesale and retail trade	3.80
133 – 37	Transport	4.10
138	Communication services	4.10

Economic Contributions of Copyright Based Industries

This section has been split in four levels of contribution by copyright based industries. First using the copyright factors discussed above, we estimate the creative value addition in core, interdependent and non-dedicated copyright based industries. This is done in real terms i.e. using base year prices of 1999-2000 as used by Pakistan Bureau of Statistics.

Once the value added estimates are known, one moves on to calculate the tax contribution of copyright based industries. We split the indirect taxes into general sales tax (at local purchase and import stage), federal excise duty and customs duty at import stage. This is followed by the contribution of copyright based industries towards exports and imports. The data on selected categories was made available for the period 2003–2008 by the State Bank of Pakistan. Finally jobs created in copyright industries have been extrapolated, based on labour force survey, census of manufacturing industries, 2006 employment survey values, provided by Pakistan Electronic Media Regulatory Authority (PEMRA).

[11]International Standard Industrial Classification (ISIC) code.

Creative Value Addition of Copyright Based Industries

Table 3 depicts the creative proportion of value added elements in the core, interdependent and non-dedicated copyright sectors.

Table 3

Creative Value Addition in Core, Interdependent and Non-Dedicated Industries
(on Real Base Year Prices of 1999-00)

Sector ID	Activities	Value Added (Rs Million)	Copyright Factor (%)	Creative Value Addition (Rs Million)
	Core Copyright Industries			
70	Newspaper and printing	3408	100	3408
149	Data processing and IT	20225	100	20225
151	Social and cultural services	17381	100	17381
154	Recreation services	3366	100	3366
155	Radio and TV broadcasts	4255	100	4255
	Total	48635	100	48635
	Interdependent Copyright Industries			
69	Paper and paper products	14560	100	14560
112	Musical instrument	3507	100	3507
	Total	18067	100	18067
	Partial Copyright Industries			
59	Art silk	17891	5	894.55
61	Made up textiles	7032	5	351.60
62	Knitwear	12080	3	362.40
63	Carpets	2706	3.5	94.71
64	Garments	27084	3	812.5
65	Leather and footwear	19885	25	4971.25
67	Wood and wood products	9858	10	986
68	Wooden furniture	1874	20	375
109	Handicrafts	285	70	200
110	Sports goods	33184	10	3318
111	Jewellery	1885	25	471.25
	Total	133764	180	12837
	Non Dedicated Copyright Industries			
131	Wholesale and retail trade	638235	3.80	24253
133–37	Transport	721946	4.10	29599.79
138	Communication services	61657	4.10	2527.93
	Total	1421838	12	56380.65
	Sum of Core + Non-Core Sectors	1622304		135919

Source: Federal Bureau of Statistics, Authors 'own estimations.
*Value added of advertising stands already taken in the heading of Newspaper and printing and Radio and TV broadcast.

In the light of the calculations mentioned above, it can be observed that core copyright sector contributes 35 percent in the creative value addition. The data processing and information technologies have the largest share of 42 percent in the total value addition by this category, followed by social and cultural services with 36 percent. Furthermore, the interdependent copyright sector contributes 13 percent in the creative value addition and the most important contributor in this category is the paper and paper products with 81 percent contribution followed by musical instrument with 19 percent. Paper and Paper products have a strong forward linkage with most services sectors.

The partial copyright sector contributes 9.4 percent in creative value addition. In this category leather and footwear, wood and wood products and art silk are the major contributors. Finally, the non-dedicated sector alone has a creative value of 41 percent; all the three sub-categories like wholesale and retail trade, transport and communication are important sectors with significant backward and forward linkages. It can be concluded that for the base year 1999-00, copyright-based industries contributed Rs 136 billion to Pakistan's GDP.

Tax Revenue Contribution of Copyright Based Industries

In this section the break-up of indirect tax contributions accruing from core and non-core sectors will be explained. Federal Board of Revenue was requested to provide details on contribution towards direct taxes. However, in the interest of data security protocol no such information was made available.[12] Information concerning indirect tax revenues for the year 2007-08 is presented in Table 4. This information has been validated through supply use tables and trade statistics on these categories, as provided by the State Bank of Pakistan.

Customs duty collected, in total, on the import of copyright-based industries, amounted to Rs 9557 million, while the amount of sales tax stood at Rs 8530 million. The receipts from excise duty were negligible. Thus the total tax revenue of over Rs 18 billion (in 2007-08) from copyright based industries shows a sizeable contribution and potential towards future indirect tax revenues.

In consolidated terms interdependent copyright industries have the highest share in tax receipts followed by partial copyright industries. The key reasons for low contribution of core sectors is that many activities under this category operate in the informal economy which on most occasions is undocumented and does not get captured in the formal tax records. The loss of revenue from this sector should act as an evidence for the government to strengthen its IP regime, so that creativity is optimally priced and those operating in the informal sector have an incentive to formalise their ventures.

Contribution of Copyright-Based Industries to Exports and Imports

Exports depend crucially upon global economic growth and the national capacity to produce goods and services. At the time of this study SBP provided us with data on classifications, requested for the period 2003-2008. The copyright sector of Pakistan is lacking in competitiveness and one of the reasons is the poor IP regulation in the country. Still, exports of core copyright sectors between 2003 and 2008 increased by 8 percent, the

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[12]While one can estimate the tax contribution based on statutory rates however given various studies on tax evasion we know that effective rate is much lower.

Table 4

Contribution of Copyright Based Industries in Indirect Taxes (2007-08)

Items	Customs Duty	Sales Tax	Excise Duty
	Rs Million		
A. Core Copyright Industries			
Printed Materials (Books, Newspaper, Magazines etc.)	78.381	131.649	
Arts and antiques	0.419	1.173	
Total A	78.8	132.822	
B. Interdependent Copyright Industries			
Photographic Goods	104.307	223.897	
Paper and Paperboard	4390.093	4835.249	
Musical Instruments	1.263	2.089	
Optical, Photographic Instruments	893.27	728.219	
Misc Manufactured Articles	420.155	210.387	
Total B	5809.087	5999.841	
C. Partial Copyright Industries			
Silk	104.639	0.068	
Wool and Fabrics	15.757	0.119	
Carpets	187.609	5.376	
Made up Textile Articles	482.19	11.036	
Articles of Stone, Plaster, Cement	252.588	248.522	
Ceramic Products	1432.989	1117.958	
Glass and Glassware	836.492	730.543	
Precious Stones/Metals	32.881	64.5	
Toys and Games	324.175	219.186	
Total C	3669.32	2397.308	
D. Non-Dedicated Copyright Industries			
Advertisement TV Cable			0.306
Total D			0.306
Total Indirect Tax Contribution (2007-08) (A+B+C+D)	9557	8530.2	0.612

Source: Federal Board of Revenue and Authors' own estimations.

interdependent copyright sectors have seen growth of 76 percent, the partial copyright sectors achieved a growth of 48 percent and the non-dedicated support industries grew by almost 100 percent.

Using copyright factors for each of the partial industries we reach a more precise contribution towards trade. In 2007-08 the growth of core copyright sectors have mainly been contributed by computer and information services, advertisements and market research. Similarly, the interdependent copyright sector's exports were mainly through contribution of cinematography, sound recorders and other accessories and paper and paperboard. From the disaggregated data it seems that our exports are heavily dependent on imported raw materials and machinery, notably photographic, cinematographic goods, electrical machinery and parts, optical and precision apparatus and computer and information services. The export trends at disaggregated commodity level are given in Table 5.

Table 5

Copyright-Based Industries Exports (2003 – 2008) Thousand US $

Categories	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Core Copyright Industries						
Books, Newspapers and Printing Industry	3,622	*6,086*	4,616	3,909	4,365	3,577
Works of Arts	17,260	6,653	23,233	15,432	6,797	2,125
Computer and Information Services				72,000	106,000	154,000
Advertisement market research and public opinion poll				20,071	24,040	23,987
Personal, Cultural and Recreation Services				1,315	2,000	3,000
Total	20882	12739	27849	112,718	143,202	186689
Interdependent Copyright Industries						
Photographic goods	919	852	779	110	85	44
Paper and Paperboard	10,019	13,613	26,296	43,976	21,833	37,304
Sound Recorders and Reproducers, Television accessories	36,522	44,940	101,892	134,605	145,330	74,128
Cinematographer	172,094	178,287	192,640	222,013	236,621	275,505
Total	219554	237692	321507	400704	403869	386981
Partial Copyright Industries						
Wood and articles of wood	13,47	11,16	15,73	10,26	10,72	16,90
Apparel and Textile	211278	226038	250700	273757	297027	314069
Carpets and other textile Floor coverings	8160	8111	9759	9503	9088	8422
Special Woven Fabrics, Tufted Textiles Fabrics, Lace	11171	19326	23338	26313	26554	16593
Knitted or Crocheted Fabrics	1408	2453	1820	1398	1977	2693
Articles of Apparel and Clothing Accessorised Knit	71356	85267	95680	97693	106060	107344
Articles of Apparel/Clothing Access not Knitted	50573	33881	36947	46434	54070	59614
Other Man-Made Textile Articles, Sets, Worm Clothing	68610	77000	83156	92416	99278	119403
Footwear, Headgear	4303	4130	6087	6417	5772	5828
Articles of Stone, Plaster, Cement,	825	1339	1156	1340	1339	1832
Total	216406	231507	257943	281514	304138	321729
Non-Dedicated Support Industries						
Transportation				44282	44778	43050
Communication Services				8118	4961	4797
Total				52400	49739	47847
Copyright-Based Industries Exports (Core + Non-Core)	456842	481938	607299	847336	900948	943246

The consolidated figures for exports of copyright sectors are presented in Table 6. We observe that a substantial amount has been exported by interdependent copyright industries, which maintained their average share at 47 percent. The important feature is the growing share of core copyright sector exports which secured a share of 20 percent in 2007-08. One of the main reasons is the creation of IPO Pakistan in 2005 and their rigorous export promotion efforts (in collaboration with the Trade Development Authority of Pakistan), are commendable for ensuring the protection of copyright sectors and especially the core copyright sectors. The partial copyright industries on average contributed 36 percent in total core and non-core exports of copyright industries. Finally, the non-dedicated sector contributed 5 percent on average.

Table 6

Consolidated Export Share (%) of Copyright Based Industries, 2002-03 to 2007-08

Categories	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Core Copyright Industries	5 %	3%	5%	13%	16%	20%
Interdependent Copyright Industries	48%	49%	53%	47%	45%	41%
Partial Copyright Industries	47%	48%	42%	33%	16%	34%
Non-Dedicated Support Industries				6%	6%	5%
Copyright-Based Industries Exports (Core + Non-Core)	100	100	100	100	100	100

Source: Own Calculation.

In Table 7 one observes the imports of disaggregated copyright sectors between 2006-08, which shows a growth of 55 percent in import of core copyright sectors, 14 percent in interdependent sectors, 150 percent in partial and 40 percent in non-dedicated sectors. These figures present a relatively high share of imports in overall external transactions; Pakistan has a trade deficit in overall as well as in core sectors.

Table 7

Copyright-Based Industries Imports (2006 – 2008) Thousand US $

Categories	2005-06	2006-07	2007-08
Core Copyright Industries			
Books, Newspapers and Printing Industry	31,584	33,693	23,404
Works of Arts	825,982	1,074,809	1,266,535
Computer and Information Services	44,034	90,000	129,000
Advertisement market research and public opinion poll	14,593	11,396	14,804
Personal, Cultural and Recreation Services	6,000	1,070	1000
Total	922193	1210968	1434743
Interdependent Copyright Industries			
Paper and Paperboard, Articles of Paper Pulp	275,944	333,769	410,277
Sound Recorders and Reproducers, Television accessories	43,976	21,833	37,304
Cinematographer (Inter Copyright)	134,605	145,330	74,128
Total	454525	500932	521709
Partial Copyright Industries			
Wood and articles of wood	61,59	6568	7053
Apparel and Textile	1855	1867	2186
Carpets and other textile Floor coverings	258	245	284
Special Woven Fabrics, Tufted Textiles Fabrics, Lace	411	377	462
Knitted or Crocheted Fabrics	152	166	181
Articles of Apparel and Clothing Accessorised Knit	195	285	217
Articles of Apparel/Clothing Access not Knitted	112	147	280
Other Man-Made Textile Articles, Sets, Worm Clothing	727	647	762
Footwear, Headgear	509	656	719
Articles of Stone, Plaster, Cement,	2582	2591	2769
Total	4946	11682	12727
Non-Dedicated Support Industries			
Transportation	117384	128535	151085
Communication Services	4141	4018	4387
Total	121525	132553	155472
Copyright-Based Industries Imports (Core + Non-Core)	1514081	1861315	2130490

Source: SBP Statistics on Import of Goods and Services (Various Issues).

Table 8 shows that in total core copyright industries contributed 68 percent in 2007-08 imports. This was followed by interdependent sectors which contributed 25 percent. It may be noted here that Pakistan's weak position in ensuring IP titles, hinders quality standards in production which are the key factors towards achieving product sophistication. Therefore Pakistan's exports use significant imported content which has foreign certification and established IP titles. In this manner Pakistani exporters in fact try to get acceptance for their finished products abroad.

Table 8

Consolidated Imports Share (%) of Copyright Based Industries 2005-06 to 2007-08

| Categories	2005-06	2006-07	2007-08
Core Copyright Industries	61%	65%	68%
Interdependent Copyright Industries	30%	27%	25%
Partial Copyright Industries	1%	1%	1%
Non-Dedicated Support Industries	8%	7%	7%
Copyright-Based Industries Imports (Core + Non-Core)	100	100	100

The trade balance for the year 2007-08 is negative for the core copyright sector amounting to $1,248,054 thousands, interdependent copyright sector is $ 134,728 thousands and non-dedicated sector is $107,625 thousands. Only the partial copyright sector is positive in trade balance of $309,002 thousands. The reason for a favourable trade balance in partial copyright sector is Pakistan's high and recognised comparative advantage in textile, particularly readymade garments.

Employment in Copyright-Based Industries

Stable employment in copyright-based industries is predominantly established in cable TV, followed by Pakistan Television (PTV), private television channels and Pakistan Broadcasting Corporation (PBC).

Figure 1 reports the employment in the electronic media, which has been extrapolated for the year 2007, using growth rates from labour force survey, census of manufacturing industries and base values for 2006 employment survey provided by PEMRA.

Fig. 1. Employment in Core Copyright-Based Industry (Electronic Media) 2007
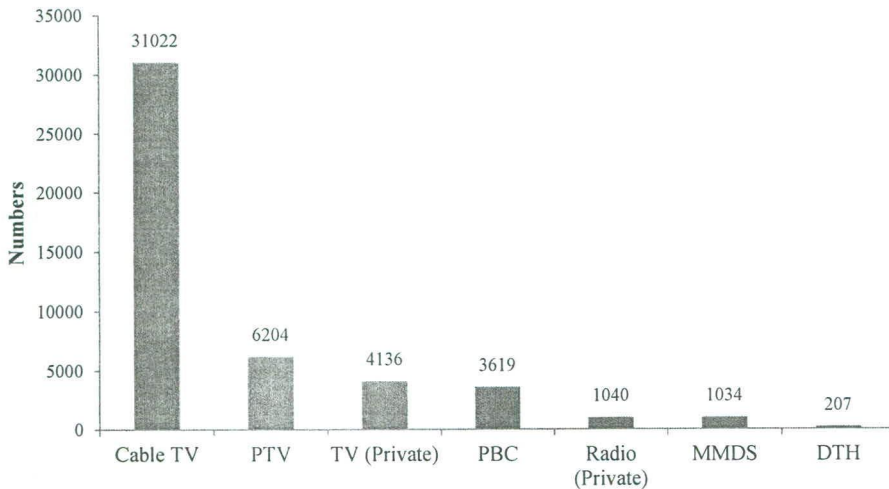
The surge in employment in the electronic media is due to the deregulation of print and electronic media during 2000s. The most eminent sector having operational licensing is the Cable TV with largest share of 92 percent, followed by FM Radio with the growth of 6 percent. The recent additions to electronic media, including multi-channel multi-point distribution system (MMDS) and direct-to-home technology (DTH) has minor contribution with percentage growth of 5 percent and 2 percent respectively for the year 2006.

Table 9 indicates that while there is growth in employment across all core copyright sectors. However there are two categories, namely data processing and TV broadcasts and graphics designing, where employment has grown many folds. Primarily the growth in these sectors is driven by the IT boom and availability of new technologies that allow handling of large amounts of data in a relatively short time.

Table 9

Employment Contributions by Core Copyright Sectors 1999 and 2007

Sector	Number of Enterprises		Estimated Employment	
	1999	2007	1999	2007
Newspaper and Printing	1344	1820	26160	38780
Data processing and IT	50	1101	990	24222
Cultural and Recreation services	–	–	175000	205000
Radio and TV broadcasts	20	1422	6500	44700
Graphic Designing	30000	67000	90000	268000
Photography	15000	18000	45000	54000
Total	71414	124343	243650	535002

Source: Information from Pakistan Media Regulating Authority-PEMRA, Pakistan Film Producers Association-PFPA, Pakistan Software Houses Association-PASHA, Pakistan Association of Printing and Graphic Industry-PAPGAI, Audit Bureau of Circulation-ABC, Photographers Society of Pakistan-PSP, Associated Press of Pakistan-APP, Face to face Interviews with professional leaders, internet search and provisional estimation.

It was difficult to determine the accurate employment levels of cultural and recreational places like hotels, cinemas, clubs, music, shrines, marriage halls, dance-theatre and other functional places. Efforts were made to gather information regarding value and contribution of these sectors. Data regarding the 4 or 5 star hotels is available in national statistics but it is difficult to account for local guest-houses and 2 and 3 star hotels. In 2007-08 the total number of hotels, cinemas, clubs and music places was around 998.

Desh (1995), using the employment per entity formula, multiplies the number of all these places by category with their respective employment levels, to estimate the total employment. Then using the copyright factors the employment contribution of all categories is obtained; we adopt the same approach. Total employment comes to around 1.73 million and the creative employment comes to around 0.259 million. Thus, the share of creative employment in the overall employment of hotels and restaurants stands around 15 percent. This is represented by the persons working in hotel industry linked with music, either live or by playing pre-recorded CDs/DVDs etc., theatre or showing TV dramas and other shows in the hotels or restaurants.

4. CONCLUSION AND POLICY RECOMMENDATIONS

The core and non-core copyright industries show a lot of potential to contribute to country's value addition, tax revenues, trade and employment. Understanding the importance of protecting these industries is important, if Pakistan is to promote innovative entrepreneurs who can in turn help in product sophistication and promotion of copyright based exports.

The key policy recommendations from this study are:

(1) A realistic level of understanding regarding the significance of copyright industries in the economic development is important. These industries are being underestimated and their contribution is not regarded tangible in production process.

(2) The System of the National Industrial Classification of the copyright categories should go from six or eight digit levels of classifications. The input-output table which helps in identifying the contributions of various industries has not been updated for a decade. PBS should embark on updating this table as well as improve its compliance with the UN System of National Accounts 1993.

ANNEX-I

Idris (2003), briefly defines the following as, Patent is an exclusive right granted for an invention, which is a product or a process that provides a new way of doing something, or offers a new technical solution to a problem. Trademark is a distinctive sign, which identifies certain goods or services as those produced or provided by a specific person or enterprise. Geographical indication is a sign used on goods that have a specific geographical origin and possess qualities or a reputation that are due to that place of origin. Most commonly, a geographical indication consists of the name of the place of origin of the goods. Industrial design is the ornamental or aesthetic aspect of an article. The design may consist of three-dimensional features, such as the shape or surface of an article, or of two–dimensional features, such as patterns, lines or color. Copyright is the body of laws which grants authors, artists and other creators protection for their literary and artistic creation, which are generally referred to as " works" a closely associated field of right related to copyright is "related rights", which provides rights similar or identical to those of copyright, although sometimes more limited and of shorter duration.

Types of copyright industries and their main groupings are given below:

Core Copyright Industries

Type of Copyright Industry	Main Grouping of Industries	Subgroups
Core Copyright Industry	Press and Literature	Authors, writers, translators
		Newspapers
		News and feature agencies
		Cards and maps, directories and other published material
		Pre-press, printing and post-press of books, magazines, newspapers and advertising materials
		Wholesale and retail of press and literature
		Libraries
	Music, theatrical productions and opera	Composers, lyricists, arrangers, choreographers, directors, performers and other personnel
		Printing and publishing of music
		Production/manufacturing of recorded music
		Wholesale and retail of recorded music
		Artistic and literary creation and interpretation
		Performances and allied agencies
	Motion picture and Video	Writers, directors, actors etc. and distribution
		Motion picture and video production and distribution.
		Motion picture exhibition
		Video rentals and sales, video on demand
		Allied services
	Radio and Television	National radio and television broadcasting companies
		Other radio and television broadcasters
		Independent producers
		Cable television (systems and channels)
		Satellite television
		Allied services
	Photography	Studios and commercial photography
		Photo agencies and libraries
	Software and databases	Programming, development and design, manufacturing
		Wholesale and retail of pre-packaged software
		Database processing and publishing
	Visual and graphic arts	Art galleries, other wholesale and retail
		Picture framing and other allied services
	Advertising Services	Agencies, buying services

Interdependent Copyright Industries

Type of Copyright Industry	Main Grouping of Industries	Subgroups
Interdependent Copyright Industries	TV sets, Radios, VCRs, CD players, DVD players, Cassette players, Electronic game equipment, and other similar equipment	Manufacture Wholesale and retail
	Computers and Equipments	Manufacture Wholesale and retail
	Musical Instruments	Manufacture Wholesale and retail

Partial Copyright Industries

Type of Copyright Industry	Main Grouping of Industries	Subgroups
Partial interdependent copyright industries	Photographic and cinematographic instruments	Manufacture Wholesale and retail
	Photocopiers	Manufacture Wholesale and retail
	Blank recording material	Manufacture Wholesale and retail
	Paper	Manufacture Wholesale and

ANNEX-II

Data Requirement under ISIC

Division	Group	Classes	Explanation	Type
22	221			
		2211	Publishing of books, brochures and other publications	Core
		2212	Publishing of newspapers, journals and periodicals	Core
		2213	Publishing of music	Core
		2219	Other publishing	Core
	222		Printing and service activities related to printing	Core
		2221	Printing	Core
		2222	Service activities related to printing	Core
	223		Reproduction of recorded media	Core
	322		Manufacture of television and radio transmitters and apparatus for line telephony	Non-Core
	642	6420	Telecommunications	
	722	7221	Software publishing	
	723	7230	Data processing	
	724	7240	Database activities and online distribution of electronic content	
73			Research and development	Non-Core
74			Other business activities	Non-Core
	742		Architectural, engineering and other technical activities	Non-Core
		7421		
		7422	Technical testing and analysis	Non-Core
	743	7430	Advertising	Non-Core
	749	7494	Photographic activities	Non-Core
92			Recreational, cultural and sporting activities	
	921	9211	Motion picture and video production and distribution	Core
		9212		Core
		9213	Radio and television activities	Core
		9214		Core
		9219		Core
	922	9220	News agency activities	Core
	923	9231	Library, archives, museums and other cultural activities	Core

Source: International Standard Industrial Classification, UN 2002.

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Book Review

Ian Gough. *Heat Greed and Human Need: Climate Change, Capitalism and Sustainable Wellbeing.* Cheltenham, UK: Edward Elgar Publisher Limited. 2017. 250 pages. $26.29 (Paperback).

The book entitled, *Heat Greed and Human Need: Climate Change, Capitalism and Sustainable Wellbeing* provides an economic, social, and political analyses of the drivers of climate change. It investigates the political economy of capitalism and offers a long-term, interdisciplinary analysis to mitigate the effect of climate change on temperature, while also improving equity and social justice. The book is divided into two parts. Part 1 covers the conceptual and global issues while Part II focuses on the affluent world. The climate change is a global threat, posing existential dangers while at the same time posing wicked dilemmas in coordinating global action to constrain it. These issues are of epochal significance and provide sufficient justification for Part I. The second part analyses 'welfare states' of the developed world. It addresses how far they are dependent on the carbon economy and how they can be reformed to pursue both carbon mitigation and human welfare simultaneously. This leads into analyses of policy-making under different scenarios of production, consumption and growth. Different 'eco-social' policies that could combine sustainable livelihood with human well-being are proposed and conclusions are summarised.

In Chapter 1, Gough argues that climate change cannot be the basic cause of poverty, ill-health, unmet basic needs and fragile livelihood. Humans have endured these conditions throughout the human history. However, the hazards of uncontrolled climate change constitute an epochal 'threat multiplier'. The author starts by presenting the predicted future of global warming and its potentially catastrophic implications for human habitats and human well-being. The policy options should aim to mitigate climate change and adapt to it but the climate policy alone could be indefensible and inequitable. There, the author argues, the goal of climate policy must be to respect biophysical boundaries while at the same time pursuing sustainable well-being, that is the well-being of the current and of the future generations as well. An acceptable and sufficient level of human well-being demands attention to distribution and issues of equity and social justice. Finally, the chapter concludes that the pursuit of well-being and social justice is inadequate if it is at the expense of the planet and future generations. Similarly, the pursuit of human well-being, while also respecting planetary limits, is unacceptable if it is at the expense of global justice and the poor of the world.

Chapter 2 delineates the theory of human needs and related frameworks to evaluate progress in both human welfare and sustainable environment. It debates that all individuals, everywhere in the world, at all times present and future, have certain basic

needs that are morally significant but individual preferences are not. Hence, needs must be met in order for people to avoid harm and to be able to function—to pursue their own goals, to participate in the society, and to be aware of and reflect critically upon the conditions in which they find themselves. The chapter recognises health and autonomy as fundamental needs universally required to enable people to participate in their social forms of life. It goes on to distinguish these universal needs from culturally specific satisfiers and sketches a way of assessing the latter. Finally, Gough debates that meeting people's basic needs, in the present and in the future, should be the first priority of justice, and satisfying needs thus takes moral precedence over satisfying consumer preferences.

In Chapter 3, author switches from normative arguments about needs and well-being to a descriptive and analytical perspective on the global framework within which the climate crisis has unfolded. This chapter employs the political economy approach to understand 'climate capitalism', a model that aims to square capitalism's need for profit and continual growth with rapid de-carbonisation of the world economy. It investigates the major drivers of emissions, including population growth, income growth, and the economic efficiency of production (emissions from production and consumption). It then turns to the social dimension by charting income and wealth inequality and its impact on emission. Gough, in this chapter, criticises the current dominant perspective of 'green growth' powered by investment in renewables and carbon-saving technological change designed to decouple emissions from the output. He concludes that all the strategies to eliminate global poverty and reduce emission are unsustainable unless the poor get a bigger slice of the whole cake, but there are limits to its expansion because of global constraints on emissions. In other words, unless a model of the global economy based on equity and justice is introduced.

The last chapter of Part I addresses questions, dilemmas, and opportunities that arise when the claim of human needs confronts the present global economic system. It asks what would constitute a moral minimum of need satisfaction across today's world and then tries to estimate what claims meeting this minimum would make on the available global carbon space. Gough claims that meeting needs will always be a lower carbon path than meeting untrammelled consumer preferences financed by ever-growing incomes. However, whether it is low enough to protect the needs of future generations will depend on the mitigation strategies and equity framework. Moreover, all existing strategies ignore the role of consumption levels and patterns in the affluent world. Finally, the chapter concludes that equity, redistribution and prioritising human needs, far from being diversions from the basic objective of de-carbonising the economy, are critical climate policies.

The first chapter (Chapter 5) of Part II traces the development of welfare states and shows how they are being eroded by external and internal pressures and have been outflanked by a rise in inequality. It employs comparative policy analysis to compare 'climate mitigation states' and welfare states. The results reveal both common trends and significant national and regional variations. It identifies three routes to de-carbonisation—green growth, recomposed consumption and de-growth and sets up a framework for tracking the relationship between climate policy and social policy within these routes. Chapter 6 discusses climate mitigation programmes to reduce regional

emissions in the North by employing the concept of green growth, a path of economic growth that uses natural resources in sustainable manners. It explains policy framework to reduce carbon emissions and discusses major mitigation strategies: pricing carbon, regulation, and strategic investment (or green investment). It demands a paradigm shift from reactive social policies to integrated 'eco-social' policies, such as 'green new deals' to supply sustainable domestic energy. Gough demonstrates that fair carbon mitigation will require a shift from the neoliberal model towards a more coordinated and actively interventionist state.

Chapter 7 turns to the second strategy, called 'recomposed consumption' for reducing emissions and global warming. It focuses on consumption and consumption-based emissions in the UK and other rich countries of the world. In this chapter, Gough highlights a serious contradiction in many high-carbon societies between securing emission reduction and ensuring an equitable distribution of real income. It is observed that redistribution of income to low-income households could raise the emissions rather than reduce because 'traditional' redistributive social policy leads to the high carbon content of basic necessities, including housing, food, and travel. The chapter then returns to the theory of human need and develops a 'dual strategy' methodology for identifying a minimum bundle of necessary consumption items and suggests how it might be used to identify maximum bundle for sustainable consumption. A 'consumption corridor' between upper unsustainable and lower unacceptable bounds is charted out. Finally, to recompose consumption in a fair way 'eco-social policies' are suggested, including regulating advertising, taxing high-carbon luxuries, rationing carbon at the household level, and socialising some high carbon services. It explains that to recompose consumption in this way will require new forms of 'eco-welfare state' at the national level. In brief, this entire approach challenges some fundamental principles of orthodox economics.

If the first two strategies fail to combat dangerous global warming due to high economic growth in the rich world, Gough, in Chapter 8 proposes a third strategy, namely 'reducing absolute consumption' to mitigate climate change. This process is usually referred to as de-growth or post-growth. This suggests a very different type of economy than what we have today: one where the emphasis is on reproduction, not production; investment, not consumption; more discretionary time, not more commodities; and more equality and redistribution, not less. It demands new institutional ways of combining sustainable consumption with equity and justice. A variety of policy solutions are proposed, including spreading wealth more evenly through alternative forms of taxation and ownership and fostering the core or social economy. The most realistic policy suggested by Gough to achieve this transition is to gradually to reduce paid work time, and thus absolute levels of income, consumption, and emission.

The last chapter (Chapter 9) presents conclusion and summarises the three-stage processes to reconcile human well-being with the sustainable environment. The first, eco-efficient green growth, requires a shift from liberal to more coordinated forms of capitalism. The second, recomposing consumption, requires at the least a shift from coordinated to more 'reflexive' form of capitalism. The third, de-growth, is incompatible with accumulation drive of any form of capitalism, which is ultimately essential for our future prosperity, if not our very existence. It is for this reason, among others, that this

book proposes an interim strategy to recompose consumption in rich countries towards low-carbon need satisfiers.

In contrast to the existing theory of maximisation, this book has made a strong case for the satisfaction of human needs—as opposed to wants—is the only viable measure for negotiating trade-offs between climate change, capitalism and human well-being, in the present and in the future. Further, it demonstrates that eliminating poverty on a world scale can only be squared with planetary sustainability if the current model of economic growth is abandoned. If the business-as-usual model were used to eliminate poverty it would devastate the planet. However, the book pays inadequate attention to incorporating the concept of minimum satisfaction of human needs to the existing graphical and quantitative models. Without incorporating 'human needs' quantitatively in different models, it is hard to understand how the optimum allocation of resources among different sectors will take place. Therefore, empirical evidence of the proposed idea is missing.

This book is useful for scholars, academicians, and policy-makers interested to study the tools to mitigate the effect of climate change. The book is also for those advocating political, social and environmental reform because it presents eco-social policies excellently to achieve both sustainable consumption and social justice.

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Shorter Notice

Jocelyn Thorpe, Stephanie Rutherford, and L. Anders Sandberg (eds.). *Methodological Challenges in Nature-Culture and Environmental History Research.* Oxon, U.K.: Routledge. 2017. 322 pages. U.K. £ 92.00 (Hardback).

For most of the research being done in the world presently, the main source is human archives. However, a new challenge is being faced by the humans that should not the non-human actors be considered more, or at least equally, important while conducting these researches, and is not all the research conducted so far human-biased. This is the core argument of this book, which is a result of a round table conference held in Guimaraes, Portugal at the World Congress of Environmental History in 2014. This book examines the challenges and possibilities of conducting cultural environmental history research today. It is a collection of essays contributed by different writers from diverse fields and disciplines to broaden the scope of current research practices to include the non-human actors like glaciers, oceans, animals, and landscapes. The book is divided into four sections and 23 chapters in total. Section 1 discusses the role of non-human actors like glaciers, which are the main exhibitor of any climatic changes. It discusses how different changes occurred in them and how could it contribute to natural, cultural, and environmental history research. An interesting part in this section discusses that how the howl of wolves in Canada changed over time and how it could provide us information to conduct our research with the help of these non-human actors. The second section discusses the challenge of removing the colonial effect from the research conducted in the past. The authors explain that the role of indigenous ways of knowing is very important. The third section is related to sense perception, i.e. how, with the passage of time, our palate developed different tastes for different types of foods and also how the sense of smell could contribute in natural, cultural, and environmental history research. Finally, Section 4 discusses role of digital apparatus, mainly the Internet, in conducting this research apart from conventional methods. A major advantage of this is the reachability of a researcher to non-academic audience. This non-academic audience could play a vital role by providing the unique data that could not even be found in past academic archives. As a whole, this collection of essays shows how we do our work matters fundamentally for what kind of work we do because how one does research is at least as important as the outcome of the research. [*Henna Ahsan*]