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Fiscal Decentralisation and Economic Growth: Role of Democratic Institutions

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This study attempts to analyse the impact of fiscal decentralisation on economic growth. It also examines the complementarity between fiscal decentralisation and democratic institutions in promoting growth. The modelling framework is the endogenous growth model augmented with measures of fiscal decentralisation through democratic institutions. To capture the multidimensionality, three different measures of fiscal decentralisation are used. The overall analysis shows that revenue decentralisation promotes economic growth while expenditure decentralisation retards economic growth. Composite decentralisation positively influences economic growth implying that simultaneous decentralisation of revenue and expenditure reinforce each other to promote economic growth. Analysis also shows that democratic institutions play a significant role in realising the benefits of fiscal decentralisation. Various policy implications emerge from this study.

JEL Classification: C26, E02, H11, H72, O11
Keywords: Fiscal Decentralisation, Democracy, Economic Growth, Pakistan

1. INTRODUCTION

Over the past three decades, there has been a growing tendency towards fiscal decentralisation (FD) in emerging and developing economies. FD occurs through devolution of fiscal responsibilities for public spending and revenue generation or collection from the central government to the provincial or local governments. FD is an effective strategy to promote economic growth by increasing the efficiency of the public sector. FD promotes sound macroeconomic management through: (i) efforts that streamline public sector activities, (ii) reducing operational and informational costs of service delivery, and (iii) increasing competition among sub-national governments in providing public services. This process strengthens government accountability towards its citizens by involving them in monitoring its performance and demanding corrective measures. This process also makes governments responsive and accountable, leading to curbing corruption and improving delivery of public services.

The implicit assumption behind the positive contribution of FD is the existence of a well-defined institutional mechanism. This increases the accountability and

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transparency in the political system and hence lowering corruption. That ultimately leads to efficient allocation of public resources and hence economic growth. The recent advancement in the field of FD strengthens this assumption and gives a role to institutions in the theorem of fiscal decentralisation.

The government of Pakistan has taken various steps towards strengthening the process of FD. The process of revenue sharing started right from the inception of Pakistan. Since independence, the Niemeyer Award 1947, the Raisman Award 1952, the One Unit Formula 1961 and 1965 and seven NFC awards based on the 1973 Constitution for revenue sharing have been announced. Recently, government of Pakistan has undertaken two major developments by signing the 7th National Finance Commission (NFC) award (through which a bulk of resources has been transferred to the provinces) and by passing the 18th Constitutional Amendment (through which a wide range of fiscal responsibilities have been shifted from the centre to the provinces). These developments would result in a fundamental shift in the division of powers between the centre and the provinces. The latter would have more autonomy in performing various functions like the provision of public goods and services, and macroeconomic management.

Consequently, various questions arise: What would be the effect of implementing FD in Pakistan? Can Pakistan, with a weak institutional framework, attain its objective of bringing prosperity to Pakistani people through FD? Can each province with its particular local receipts generate and expand the economy? Malik, *et al*. (2007) and Faridi (2011) investigate the growth effects of FD in Pakistan and find positive contributions of FD. However, these studies suffer from various shortcomings. Firstly the studies ignore the possibility of reverse causality and endogeneity among fiscal variables as pointed out in the literature [see e.g. Zhang and Zou (1998); Xie, *et al*. (1999); Thiessen (2003); Jin, *et al*. (2005); Iimi (2005)]. Secondly, the studies ignore the multidimensional perspectives of FD [see e.g. Martinez-Vazquez and McNab (2003)]. Thirdly, the studies ignore the potential role of democratic institutions in making FD process effective and growth enhancing [see e.g. Iimi (2005); Neyapti (2010)].

This study offers an empirical assessment of the growth effects of fiscal decentralisation using various measures of decentralisation. Secondly, the role of democratic institutions in explaining the growth effects of fiscal decentralisation is examined. To the best of our knowledge, no study to date has investigated the role of democratic institutions in explaining the growth process of fiscal decentralisation. This study's modelling framework is the endogenous growth model augmented with the measures of fiscal decentralisation and democratic institutions. The possibility of reverse causality and endogeneity among fiscal measures leads to the use of a GMM approach to estimation.

The rest of this paper is structured as follows: Section 2 summarises the existing literature concerned with the growth effects of FD; Section 3 provides an overview of the FD process in Pakistan; the modelling framework and the data and econometric issues are explained in Section 4 and Section 5 respectively; Section 6 presents the results of this study and Section 7 the conclusion.

2. LITERATURE REVIEW: THEORETICAL AND EMPIRICAL

Before proceeding with this study, it is important to have a broad idea of the current developments in the theoretical and empirical literature on FD.

The impact of FD on economic growth is derived from the traditional theory of fiscal federalism which presents a general normative framework for the assignment of functions to different levels of governments. Under the traditional theory, the process of FD may generate greater economic efficiency in the allocation of resources in the public sector.[1] There are various theoretical explanations available in the literature that spell out how FD generates economic efficiency in public sectors.

First, economic efficiency can be generated through resource mobilisation which occurs through FD. FD grants greater autonomy and funds to the sub-national governments. With the availability of more funds and autonomy in decision making process, sub-national governments are compelled into mobilising the available resources in their own jurisdictions, rather than waiting for the provision of public goods and services to come from the central government. This leads to greater emphasis on economic efficiency across jurisdictions within a country and also to tapping into what otherwise may have been untapped potential [Rodriguez-Pose and Ezcurra (2010)].

Second, the "Theorem of Decentralisation" provides a well-known mechanism through which FD may lead to greater economic efficiency. According to this theorem, the preferences for public goods and services differ across individuals and regions. The level of welfare achieved by a national government through providing uniform public goods and services is always inferior to that which can be achieved by providing public goods and services in a decentralised setup which allows for provision of goods and services across the different regions [Oates (1972)]. It is because the sub-national governments are better informed about the preferences of citizens than the national government. Therefore, sub-national governments always perform better in providing public goods and services according to the needs of local communities.

Similarly economic efficiency can be enhanced if the citizens are mobile so that they can locate themselves to the jurisdictions that best match their preferences [Tiebout (1956)]. Oates (1993) argues that expenditures for social and infrastructure sectors are likely to be more growth enhancing if carried out by sub-national governments than the central government which may ignore the differences in preference. The growth enhancing advantages linked with the FD process are more visible in larger and more heterogeneous countries. In a small country with homogenous characteristics the informational advantages of implementing policies and providing different public goods and services at the regional or local level may be limited. The benefits of FD increase because internal heterogeneity causes the preferences of individuals to be more diverse. Hence the benefits of FD can only be realised beyond a certain threshold of country size [Rodriguez-Pose and Ezcurra (2010)].

Third, the competition among the jurisdictions is seen as an important mechanism to encourage efficiency in taxation, regulation and supply of goods and services [Tiebout (1956); Brennan and Buchanan (1980)]. In the Public Choice Approach, FD may lead to competition among the jurisdictions for mobile factors of productions. This forces discipline upon public officials who tend to pursue their own interest and seek to maximise their revenues. Similarly, fiscal competition among different levels of government leads to a market-preserving federalism which minimises the extent of government interventions, hence maintaining market efficiency [Weingast (1995)].

[1]According to Giugale and Webb (2000) efficiency means satisfying the needs and preferences of taxpayers at the lowest possible cost.

The positive impact of FD has been challenged in the previous literature [see for example Prud'homme (1995); Tanzi (1996)]. The critiques are based on the assumptions that underlie the decentralisation models and the problems faced by local governments. The proponents of decentralisation claim that local governments have an informational advantage over the central government. However, this assumption can be challenged on the grounds that central governments can and do assign government officials to local offices. Apparently there is no compelling reason to believe that the information obtained by these representatives will be less accurate than the ones gathered by the local governments [Tanzi (1996)]. Similarly, it is also argued that local governments take into account the needs and preferences of the local population and provide public goods and services accordingly. Tanzi (1996) criticizes this assumption by saying that the local populations may not have the power to actually influence the actions of the local officials. This may result in local goods being produced without taking into account the needs and preferences of the local population. This is because local democracy is relatively weak and ineffective especially in developing countries. Prud'homme (1995) also argues that local preferences are complex and manifold. They cannot be expressed in a single vote. The outcomes of local elections generally depend on personal and/or political loyalties and rarely reflect the preferences of the local population.

The opponents of decentralisation argue that there is a lack of capacity to execute the responsibility for public services at sub-national levels. The sub-national governments are usually less efficient than the national government and this may undermine the benefits of decentralisation [Tanzi (1996)]. There are problems like low investment in technology and innovation because of the limited capacity, both financially and technically, of the sub-national governments [Prud'homme (1995)]. Due to the inefficiency of local bureaucracies, local governments often lack good public expenditure management systems to assist them in their tax and budget choice [Tanzi (1996)].

Another potential problem usually associated with FD is the raiding of the fiscal commons by the local governments due to the presence of a soft-budget constraint.[2] In the case of a decentralised system, sub-national governments may expect that their fiscal deficits are covered by the central government. This in turn undermines the incentive for sub-national governments to behave responsibly in handling finances. The soft budget constraints have "a multiplicity of sources that are associated with the prevailing fiscal institutions, with the existing political structure, the weakness or even absence of various important markets, and more importantly, the historical background of intergovernmental fiscal affairs in the country" [Rodden, *et al*. (2003)].

Most of the criticism against decentralisation does not dismiss the idea of decentralisation per se, but is rather meant to highlight the need for augmenting the decentralisation process with certain types of institutions. According to the critics, only when these institutions are present does decentralisation bear the fruits that are promised by its proponents. The benefits of decentralisation largely depend on institutional arrangements that govern the design and implementation of decentralisation.

[2]The idea of soft budget constraint was introduced by Kornai (1979) to analyse the behaviour of state owned firms. The SBC is used in a decentralisation system to refer to lower level governments that look to a higher level government to recover or bailout their excessive deficits. The term bailout refers to the additional funding that the higher level government provides the lower level governments when it would otherwise be unable to service its obligations. On the other hand, hard budget constraint (HBC) implies that lower level governments have to face the full costs of their expenditure decisions.

Given the lack of theoretical consensus on the impact of FD, numerous studies have empirically examined the impact of FD on economic growth.There are numerous studies that find a positive and significant relationship between FD and economic growth [Oates (1995); Yilmaz (1999); Thiessen (2003); Iimi (2005)]. However, various other studies, have found a negative or even no relationship between FD and economic growth [Oates (1972, 1985); Davoodi and Zou (1998); Woller and Phillips (1998); Martinez-Vazquez and McNab (2006); Thornton (2007); Baskaran and Feld (2012); Rodriguez-Pose and Ezcurra (2010)].

There are at least five possible reasons why the studies have failed to come up with conclusive results on the role of FD. First, the differences in the outcomes of these studies may be because different studies have employed different measures of FD. The literature indicates that it is difficult to measure the allocation of authority with precision. If ambiguous or inappropriate measures of FD are employed, wrong judgments about the growth effects of FD can be made [Ebel and Yilmaz (2003)]. Akai and Sakata (2002) argue that studies which find a negative association between FD and economic growth employ incorrect measures of FD. Second, the differences in the outcome of empirical studies that are based on a cross-country analysis may be due to the differences in the economic, cultural, geographical and institutional set-ups. In order to overcome these difficulties, single-country studies have also been conducted. However, the outcome of these studies is still inconclusive: some find a positive and significant association [see e.g. Akai and Sakata (2002); Malik, *et al*. (2007); Carrion-i-Silvestre, *et al*. (2008); Samimi, *et al*. (2010); Nguygen and Anwar (2011)] while others find a negative or even no relationship between FD and economic growth [see e.g. Xie, *et al*. (1999)]. Third, different countries have different levels of FD, making it difficult to get consistent and robust estimates based on a cross-country analysis. Fourth, the literature identifies the possibility of reverse causality and endogeneity among FD and economic growth [see e.g. Zhang and Zou (1998); Xie, *et al*. (1999); Lin and Liu (2000); Thiessen (2003); Jin, *et al*. (2005)]. Martinez-Vazquez and McNab (2003) argue that reverse causality occurs because efficiency gains from FD emerge as the economy's growth or more decentralisation is demanded at relatively higher level of development. However, existing literature does not control endogeneity due to small sample sizes or the difficulty in finding valid instruments with the only exception of Iimi (2005). Last, existing literature mainly ignores the role of democratic institutions in making the FD process effective with a few exceptions. For example, Iimi (2005) incorporates the role of political institutions in analysing the role of FD. That study finds that political institutions and FD complement each other in promoting economic growth.

There is thus a clear need to re-examine the growth effects of FD, especially at the country level using appropriate estimation methodology and measures of FD.

3. FISCAL DECENTRALISATION IN PAKISTAN: AN OVERVIEW

The need for FD arose due to the mismatch between expenditure requirements and the revenue generation capacity. This mismatch necessitates the inter-governmental transfer among the federation and provinces which is a vital part of the decentralisation process. The horizontal as well as vertical mismatch between revenue and expenditure requires legislative arrangement on financial transfers among different levels of

government. In both developed and developing countries, the difference between revenue generation and actual expenditure across national and sub-national governments is commonly observed. Cross-country data on revenue and expenditure shows that there is a huge mismatch between the revenue generation capacity of the national government and the sub-national governments. A similar mismatch is observed between national and sub-national government from the point of view of expenditures. In the case of Pakistan, there is a serious imbalance in the sub-national expenditures and revenue generation. The statistics indicate that the revenue generation capacity of provincial governments is nearly 13 percent of the total revenue. On the other hand, the expenditure needs of provincial governments are approximately 28 percent of the total expenditure (Table 1).

Table 1

National vs. Sub-National Revenue and Expenditure Shares: International Comparison

	Revenue Share		Expenditure Share	
Country	National	Sub-National	National	Sub-National
Australia	69	31	54	46
Brazil	69	31	54	46
Canada	44	56	37	63
India	66	34	45	55
South Korea	95	05	50	50
Pakistan	92	08	72	28

Source: Watt (2005).

These imbalances between expenditure obligations and revenue among federal and provincial governments leads to a large amount of transfers of financial resources from the former to the latter level. Such transfers and sharing of resources are embedded within the constitution and supported by a series of legislative rules and regulations. Inter-governmental transfers typically include revenue shares, grants, straight transfers, loans and provincial revenues collected by federal government and transferred to provinces after deducting collection charges (e.g. royalties on gas and crude oil). There is a well-defined mechanism for the distribution of resources from the federation to the provinces in Pakistan. The resources are transferred from the federal to the provincial level through the National Finance Commission (NFC). NFC is an autonomous body established under the Constitution of Pakistan for the re-distribution of resources from the federation to the provinces. The resources are collected by the federal government and distributed among the provinces according to their needs.

The amount of resources transferred from the central government to the lower level government is determined on the basis of a certain agreed formula. In Pakistan, the only criterion for resource distribution has been the population since independence up to 2009. For the first time a new criterion was designed for resource distribution among the provinces in the 7th NFC award. In this award, four different indicators are used to define the share of each province in the total share to provinces, including (i) population, (ii) backwardness/poverty, (iii) revenue generation/collection capacity, and (iv) inverse population density (IPD) (Table 2).

Table 2

Sharing Criterion in Various NFC Awards

Award	Sharing Criteria (Weight)
NFC 1990	Population (100%)
NFC 1996	Population (100%)
NFC 2006	Population (100%)
NFC 2009	Population (82%), Poverty (10.3%), Revenue (5%), IPD (2.7%)

In this formula, the population, once again, has the major share of 82 percent in total while poverty/backwardness has 10.3 percent share, revenue generation/collection has 5 percent and inverse population density (IPD) 2.7 percent.

The share of each province in the divisible pool has also changed over time (Table 3). The share of Punjab was 57.87 in the 1990 NFC award based on its population, whereas there was a minor decrease in 2006. However, after the 7th NFC award in 2009, the share of Punjab has gone down to 51.74 percent, mainly due to a change in the distribution formula. The share of Sindh was 23.29 percent in 1990 on the basis of its population; now it has increased to 24.55 percent in 2009. The share of KPK was 13.54 in 1990 which has increased to 14.62 in 2009. Similarly the share of Balochistan has increased from 5.3 percent in 1990 to 9.09 percent in 2009 on the basis of the revised formula.

Table 3

The Share of Each Province in the Divisible Pool (Percent)

Province	NFC-1990	NFC-1996	NFC-2006	NFC-2009
Punjab	57.87	57.37	57.37	51.74
	(57.87)	(57.87)	(57.36)	(57.36)
Sindh	23.29	23.29	23.71	24.55
	(23.29)	(23.29)	(23.71)	(23.71)
KPK	13.54	13.54	13.82	14.62
	(13.54)	(13.54)	(13.82)	(13.82)
Balochistan	5.30	5.30	5.11	9.09
	(5.30)	(5.30)	(5.11)	(5.11)
TOTAL	100.00	100.0	100.0	100.0

Note: Population shares are reported in parenthesis based on Census conducted before the NFC Award.

4. MODELING FRAMEWORK

Fiscal decentralisation, the subject matter of this study, refers to the devolution of policy responsibilities for public spending and revenue collection from the central to the provincial governments. Davoodi and Zou (1998) use the endogenous growth framework to analyse the growth effects of FD. This study extends Barro's (1990) endogenous growth model by assuming that public spending is carried out at three levels of government: federal, state, and local. Later on, various studies use this analytical framework to quantify the impact of FD on economic growth [see e.g. Xie, *et al*. (1999); Iimi (2005)]. In Pakistan, there are two levels of government: the federal and the

provincial which carry out public spending. Thus total government spending is divided into two components: federal level and provincial level government spending.

The benefits of FD can only be realised if the process is complemented with good institutions which enhance the efficiency of the public goods and services by meeting the preferred needs of the local citizen; by increasing competition among provincial governments; by reducing corruption and by enhancing accountability The role of institutions is very crucial in making the theorem of decentralisation applicable. Iimi (2005) further extends this framework by incorporating the interactive term of FD and political institutions in the model. Following Iimi (2005), the following model is defined to capture the link among FD, democratic institutions and economic growth:

$$GDPg_t = \delta_0 + \delta_1,\tau_t + \delta_2 FD_t + \delta_3 INS_t + + \delta_4 FD_t * INS_t + \delta X_t' + \varepsilon_t$$

Where *GDPg* is the per capita output growth rate, τ is the tax rate, *FD* is the measure of fiscal decentralisation, *INS* represents democratic institutions, *X* is the vector of control variables, ε is the disturbance term that is assumed to be serially uncorrelated and orthogonal to the explanatory variables and t (=1,2… … … .N). δ_0, δ_1,δ_2,δ_3 and δ_4 are the scalar parameters while δ is the vector of parameters to be estimated. The vector *X* consists of control variables that have frequently been used in growth literature as identified by Mankiw, *et al*. (1992), Levine and Renelt (1992), Barro and Lee (1996) and Sala-i-Martin (1997).

In this model, the interaction term, $FD * INS$ should be of particular interest since it allows us to test the hypothesis of *FD* and democratic institutions being complementary. Based on this model, we aim to empirically examine the following hypotheses:

(i) Fiscal decentralisation influences the evolution of per capita output.
(ii) Fiscal decentralisation and democratic institutions are complementary.

5. DATA AND ECONOMETRIC ISSUES

Our empirical analysis is based on time series data covering the period 1972-2010. Data on fiscal decentralisation variables is collected from the Fifty Year Economy of Pakistan and various annual reports published by the State Bank of Pakistan. Data on other economic variables is mainly taken from the Economic Survey of Pakistan (various issues). Data on human capital is taken from the Barro and Lee Dataset 2011 and data on democratic institutions is taken from the Polity IV Dataset.

5.1. Fiscal Decentralisation Measures

To empirically examine the role of FD, it is necessary to develop measures of FD. There are two widely used measures of fiscal decentralisation, namely the revenue decentralisation and the expenditure decentralisation based on 'Budget Data'. Revenue decentralisation (RD) is measured as a ratio of the sub-national government's revenue to the total government revenue (national plus sub-national). Expenditure decentralisation (ED) is measured as a ratio of sub-national government's expenditures to the total government expenditures (national plus sub-national). Oates (1972) defines expenditure centralisation as the share of the central government spending in the total

public spending and revenue centralisation as the share of central government revenue in the total revenue. Woller and Phillips (1998) re-define fiscal decentralisation measures after making a few adjustments. First, in measuring revenue decentralisation, they subtract the grant-in-aid given to sub-national government from the total revenue and treat it as an expense to avoid double counting. Second, in measuring expenditure decentralisation, they exclude social security and defence spending from the total public spending as these are considered to be the main parts of the non-decentralised government spending.

These standard indicators have been used in a number of studies to quantify the impact of FD.[3] However, the approaches to measure the degree of FD and the reliability of the data have long been debated in theoretical as well as in empirical literature. The data for FD measures are obtained from the Government Finance Statistics (GFS) of the International Monetary Fund (IMF). Ebel and Yilmaz (2003) identify three major issues with GFS data. First, it is not possible to identify the degree of local expenditure autonomy because the expenditures are reported at the level of government that receives the amount. In this way, the local spending that is directed by the central government is added in the sub-national spending. Second, it is not possible to identify the main source of revenues of the sub-national government, whether collected through shared taxes, own taxes or piggybacked taxes. Third, GFS does not distinguish between the different types of intergovernmental transfers, whether these are conditional or distributed according to some criteria. Therefore, the GFS data ignores the degree of control of the central government over the revenues and expenditure of the sub-national governments. These shortcomings considerably overestimate the degree of FD [Stegarescu (2005)].

According to Martinez-Vazquez and McNab (2003), these measures are defined on the basis of a single dimension of FD—expenditures going through the sub-national budgets or revenue generated by the sub-national governments. FD, however, is a multidimensional phenomenon and it requires multidimensional measures to depict a true picture of decentralisation. Martinez-Vazquez and Timofeev (2010) develop a composite indicator of FD that captures the multidimensionality nature of the FD process. The 'Composite Ratio', developed by Martinez-Vazquez and Timofeev (2010), essentially combines the information contained in expenditure and revenue ratios. Taking into account the existing literature and availability of data, three indicators are constructed to measure the level of FD for Pakistan.[4]

Revenue Decentralisation (RD)

The revenue decentralisation (RD) is measured as the ratio of the provincial government's revenue to the total government revenue (federal plus provincial)

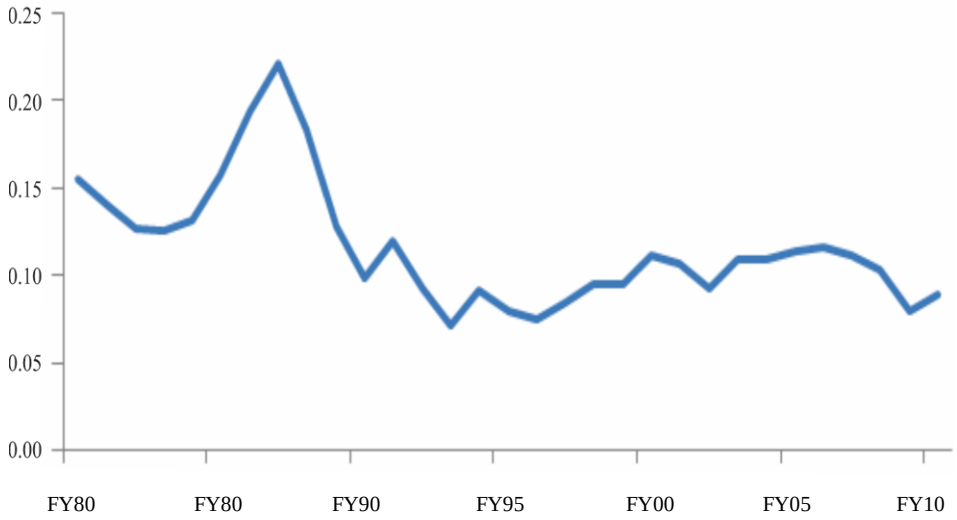
$$RD = \frac{PR}{PR+FR}$$

[3]See for example [Oates (1995); Zhang and Zou (1998); Xie, *et al*. (1998); Yilmaz (1999); Lin and Liu (2000); Thiessen (2003); Akai and Sakata (2002); Eller (2004); Iimi (2005); Feltensteina and Iwata (2005); Cantarero and Gonzalez (2009); Neyapti (2010)].

[4]Due to unavailability of fiscal data at local level, this analysis only focuses at aggregate level using time series data. This analysis also ignores the other dimension of decentralisation namely administrative and political dimensions of the decentralisation because of the same reason.

Where *RD*, *PR* and *FR* are the 'Revenue Decentralisation', 'Provincial Revenue' and 'Federal Revenue' respectively. Figure 1 shows the trend in revenue decentralisation in Pakistan. The share of provincial government revenue in total government revenue ranges from 10 to 25 percent. The share of provincial governments' revenue was 15 percent in total government revenue in 1980, thereafter showing an increasing trend to reach 23 percent in 1987. After this period, there is a decreasing trend in revenue decentralisation whereby provincial revenue share in total government revenue reaches 10 percent in 2010.

Fig. 1.Revenue Decentralisation in Pakistan



Source: Author's own calculation.

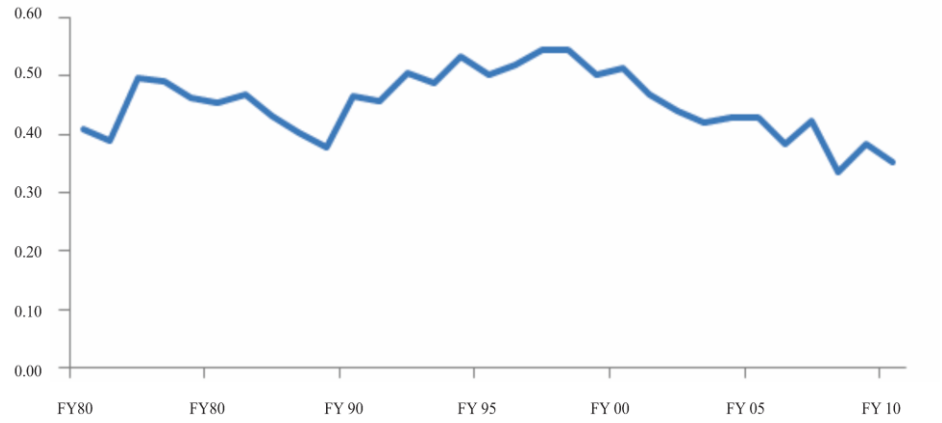
Expenditure Decentralisation (ED)

The expenditure decentralisation (ED) is defined as the ratio of provincial government expenditures to the total government expenditures (federal plus provincial) less the defence expenditures and interest payments on debt. These expenditures are mainly considered to be part of the non-decentralised government expenditures.

$$ED = \frac{PE}{PE+FE-(DE+IE)}$$

Where *ED*, *PE* and *FE* are the 'Expenditure Decentralisation', 'Provincial Expenditure' and 'Federal Expenditure' respectively. While *DE* and *IE* are defence expenditure and interest payments respectively. Figure 2 represents the historical trend in expenditure decentralisation in Pakistan. The share of provincial government expenditure in total government expenditure ranges from 30 to 60 percent during the last three decades. After reaching 50 percent in 1982, the share of provincial government expenditure shows a declining trend reaching 39 percent in 1989. For the greater part of the 1990s, expenditure decentralisation shows an increasing trend. However, after 1998 once again, provincial shares in total expenditure show a decreasing trend, declining from 55 percent in 1998 to 35 percent in 2010.

Fig. 2.Expenditure Decentralisation in Pakistan



Source: Author's own calculation.

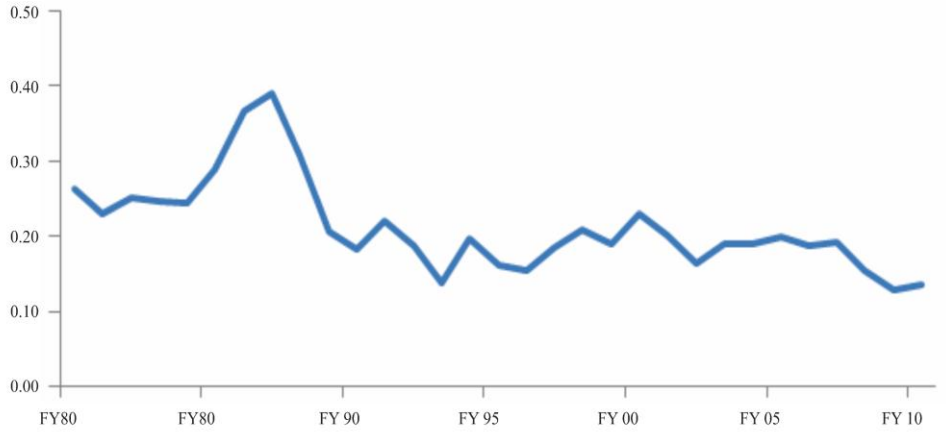
Composite Decentralisation (CD)

Composite decentralisation is measured using both revenue decentralisation and expenditures decentralisation. It is more useful in terms of analysing the impact of FD on economic growth.

$$CD = \frac{RD}{1 - ED}$$

Where *CD*, *RD* and *ED* are the 'Composite Decentralisation', 'Revenue Decentralisation' and 'Expenditure Decentralisation' respectively. Figure 3 shows the composite of revenue and expenditure decentralisation in Pakistan. This represents the combined outcome of both processes. The trend shows that the 'Composite Decentralisation' measure ranges from 13 to 40 percent.

Fig. 3.Composite Decentralisation in Pakistan



Source: Author's own calculation.

5.2. Other Control Variables

The dependent variable is GDP per capita growth rate. Descriptive statistics show that the average GDP per capita is 451 US$ at constant 2000 prices. The average growth rate of GDP per capita is 2.234. Human capital (HC) is measured using total secondary school enrolment without considering age and gender composition. The average human capital is 20.02 and it moves from 7.1 in 1972 to 34.6 in 2010. Openness (OPN) is defined as the ratio of total trade (imports plus exports) as percent of GDP. Trade openness varies from 27 percent to 42 percent with the average of 34 percent. Tax to GDP ratio is measured as the ratio of the total consolidated tax receipts of government to GDP. The average tax to GDP ratio is 12 percent with the range of 9 to 15 percent. The contribution of taxes in economic growth crucially depends upon the structure of the taxes. The impact of taxation on economic growth is positive if private capital is less productive than public capital and is negative if additional taxation is very expensive (Iimi, 2005). Inflation is measured as the growth rate of CPI. The average inflation rate is 9.6 varying from 3.1 percent to 30 percent. The overall budget deficit (BD) fluctuates between 2.3 and 10.2. On average the overall budget deficit is 6.5 in Pakistan. Democracy is used as a proxy for measuring the quality of institutions in Pakistan. The data on democracy is taken from the Polity IV dataset published by Marshall and Jaggers (2011). The democracy index ranges from +10 (full democracy) to -10 (full autocracy). The descriptive statistics show that the average quality of institution is 0.85 with the range of -7 to +8 in Pakistan.

Table 4

Descriptive Statistics

Variables	Obs.	Mean	Std. Dev	Min	Max
Revenue Decentralisation (RD)	39	0.130	0.041	0.071	0.221
Expenditure Decentralisation (ED)	39	0.465	0.067	0.336	0.686
Composite Decentralisation (CD)	39	0.247	0.089	0.129	0.494
Inflation (INF)	39	9.587	5.748	03.10	30.00
Budget Deficit (BD)	39	6.464	1.805	02.30	10.20
GDP per Capita (Constant 2000 US$)	39	451.7	113.3	279.1	668.6
GDP per Capita Growth Rate	39	2.234	2.002	-1.950	6.570
Human Capital (HC)	39	20.02	7.111	10.54	34.60
Openness (OPN)	39	0.338	0.037	0.273	0.432
Tax to GDP Ratio (T/GDP)	39	0.123	0.015	0.095	0.145
Democratic Institution (INS)	39	0.846	6.745	-7.000	8.000

There are several studies that have used the Ordinary Least Squares (OLS) estimation technique to empirically investigate the impact of FD on economic growth. A number of studies identify the possibility of reverse causality and endogeneity among FD and economic growth [see e.g. Zhang and Zou (1998); Xie, *et al*. (1999); Lin and Liu (2000); Thiessen (2003); Jin, *et al*. (2005)]. Martinez-Vazquez and McNab (2003) argue that reverse causality exists because efficiency gains from FD emerge as economies grow or more decentralisation is demanded at relatively higher levels of development. However, the existing literature does not control endogeneity due to small sample sizes or

the difficulty in finding valid instruments with the only exception of Iimi (2005). Under this situation, OLS estimates become biased and inconsistent. To tackle endogeneity, the instrumental variables (IV) methods are used in the empirical estimations. The IV methods are used to solve the problems of simultaneity bias between explanatory variables, the dependent variable and the error measurement.

The application of the generalised method of moments (GMM) can be considered as an extension of the IV estimation method. The main advantage of the GMM estimation method is that the model need not be serially independent and homoscedastic. Another benefit of the GMM estimation technique is that it generates parameters through maximising the objective function which includes the moment restrictions in which correlation between the lagged regressor and the error term is zero. Keeping the advantages of the GMM estimation technique to overcome endogeneity and omitted variable bias, the GMM estimation procedure developed by Arellano and Bond (1991), Arellano and Bover (1995) has been applied to estimate growth and stability equations using lagged values of the variables as instruments. The STATA v11 has been used for estimation.

The standard approach to determine the stationarity of the time series data is checking the existence of unit roots in the given series. The most commonly employed test for unit root analysis is called Augmented Dickey Fuller (ADF) test [Dickey and Fuller (1981)]. The results of the ADF test are reported in Table 5. The test statistics indicate that inflation, budget deficit, GDP per capita growth rate, openness and M2 to GDP ratio are stationary at level. While revenue decentralisation, expenditure decentralisation, composite decentralisation, macroeconomic instability index, human capital, capital stock per worker, tax to GDP ratio and democratic institutions are non-stationary at level and become stationary at first difference which implies that these variables are difference stationary with one order of integration.

Table 5

Unit Root Test (ADF Test)

	Level			First Difference		
Variables	No Trend	With Trend	Result	No Trend	With Trend	Result
Revenue Decentralisation (RD)	–2.13	–3.24	NS	–4.63	–4.56	S
Expenditure Decentralisation (ED)	–1.72	–2.48	NS	–7.19	–7.02	S
Composite Decentralisation (CD)	–1.69	–3.41	NS	–5.49	–5.43	S
Inflation (INF)	–4.02	–3.62	S			
Budget Deficit (BD)	–2.95	–3.77	S			
GDP per Capita Growth Rate	–5.72	–5.63	S			
Human Capital (HC)	1.29	–2.26	NS	–4.19	–5.23	S
Openness (OPN)	–2.93	–3.56	S			
Tax to GDP Ratio (T/GDP)	–1.32	–2.02	NS	–5.12	–5.71	S
Democratic Institution (INS)	–1.97	–1.91	NS	–5.71	–5.76	S

Note: 5 percent critical value is –2.87 for the case of no-trend, and –3.42 when a trend is included. AIC is used for lag selection. S stands for stationary series and NS stands for non-stationary series.

6. EMPIRICAL RESULTS

This study has estimated the impact of various dimensions of FD on economic growth. In Table 6, the impact of revenue decentralisation on economic growth is shown. Various specifications to test the robustness of results have been used.

Revenue decentralisation has a positive and significant impact on economic growth in all specifications which are consistent with the theory of decentralisation. This positive association indicates that the higher the level of decentralisation on revenue side, the higher the GDP per capita. The transfer of revenue enhancing responsibilities to provincial governments is conducive for economic growth in Pakistan. As shown in table 6, this result is robust, regardless of the inclusion of other control variables; the estimated impact of revenue decentralisation on economic growth remains positive and significant.

Table 6

The GMM Estimates: Dependent Variable (GDP per Capita Growth)

Variables	(1)	(2)	(3)	(4)	(5)
RD	0.0206*	0.0455***	0.0461***	0.0487***	0.0530***
	(0.0120)	(0.0167)	(0.0176)	(0.0160)	(0.0173)
OPN		0.0414**	0.0705**	0.0625*	0.0245
		(0.0204)	(0.0327)	(0.0337)	(0.0317)
T/GDP		0.0475*	0.0592*	0.0675**	0.0808**
		(0.0274)	(0.0312)	(0.0276)	(0.0348)
HC		0.0505***	0.0515***	0.0381**	0.0426**
		(0.0159)	(0.0190)	(0.0157)	(0.0185)
INF			–0.00966*		–0.00687*
			(0.00529)		(0.00399)
BD				–0.0292***	–0.0337***
				(0.00852)	(0.00939)
Constant	0.0658**	0.113*	0.112*	0.243***	0.251***
	(0.0263)	(0.0642)	(0.0640)	(0.0690)	(0.0698)
Observations	37	37	37	37	37
R-squared	0.247	0.409	0.408	0.532	0.546
Wald Chi2 Test	3.92	10.31	11.67	31.41	36.38
Normality Test	0.97(0.61)	0.70(0.71)	0.71(0.70)	0.77(0.68)	0.88(0.64)
Endogeneity Test	0.0685	0.0885	0.0711	0.0625	0.0305
Over Identification test	0.7070	0.9423	0.9638	0.5625	0.6446
D. W. Test	1.89	2.42	2.43	2.59	2.71

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

The impact of expenditure decentralisation on economic growth is measured using five different specifications and results are reported in Table 7. Expenditure decentralisation has a negative and significant impact on economic growth in all specifications.[5] As shown in Table 7, these results are robust, regardless of the inclusion of other control variables; the estimated impact of ED on economic growth remains negative and significant. The negative association between ED and economic growth implies that *ED* has growth retarding effects in Pakistan. These results are in contrast to

[5]In terms of the negative association of expenditure decentralisation with economic growth, our findings are in line with the findings of other empirical studies such as Davoodi and Zou (1998), Zhang and Zou (2001), Rodriguez-Pose and Kroijer (2009) and Nguygen and Anwar (2011).

the theory of decentralisation. Davoodi and Zou (1998) find similar results for developing countries. There are several justifications that explain the negative association of expenditure decentralisation with economic growth in Pakistan.

First, the composition of public spending carried out by provincial governments may explain the growth retarding effects of *ED*. The expenditure decentralisation measure in this dissertation does not indicate the composition of the public spending of the provincial governments. Provincial governments generally allocate excessive amounts to current expenditure instead of capital and infrastructure spending. The literature suggests that the growth effects of capital and infrastructure spending are positive and that of current spending are negative.

Second, the institutional weaknesses at the provincial level may lead to more corruption and hence lower economic growth. The third reason may be the lack of autonomy in decision making by the provincial governments that in turn can lead to inefficient outcome. The process of FD may not materialise in its true sense because the decisions by provincial governments may still be influenced by the federal government. Fourth, the provincial governments may be unable to execute proficient policies and organise efficient governance due to lack of human as well physical resources. Fifth, the provincial government may not be able to achieve economies of scale for the reason that they may be too small to efficiently carry large scale infrastructure development projects. Finally, the provincial governments often lack the institutional framework that is required to gain the benefits of FD. The lack of institutional framework can contribute to more corruption, less accountability and inefficiency in the policy making processes, causing a slowdown in the growth process. Similar arguments are put forward by Martinez-Vazquez and McNab (2006) to explain the negative relationship between expenditure decentralisation and economic growth for developing countries.

Table 7

The GMM Estimates: Dependent Variable (GDP per Capita Growth)

Variables	(1)	(2)	(3)	(4)	(5)
ED	–0.0922**	–0.116***	–0.129***	–0.115***	–0.122***
	(0.0400)	(0.0392)	(0.0317)	(0.0341)	(0.0338)
OPN		0.0385*	0.0274*	0.0251*	0.0238*
		(0.0215)	(0.0162)	(0.0135)	(0.0127)
T/GDP		0.0371*	0.0387*	0.0497*	0.0498*
		(0.0196)	(0.0201)	(0.0285)	(0.0291)
HC		0.0241*	0.0183*	0.0266*	0.0279*
		(0.0128)	(0.0103)	(0.0144)	(0.0149)
INF			–0.00980*		–0.00598*
			(0.00577)		(0.00332)
BD				–0.0368***	–0.0346***
				(0.0118)	(0.0130)
Constant	–0.0509*	0.0289*	0.0547	0.190***	0.194***
	(0.0300)	(0.0171)	(0.0581)	(0.0552)	(0.0555)
Observations	37	37	37	37	37
R-squared	0.207	0.421	0.493	0.451	0.537
Wald Chi2 Test	5.32	11.54	27.28	19.73	25.22
Normality Test	0.31(0.85)	0.67(0.72)	0.37(0.70)	0.24(0.88)	0.16(0.92)
Endogeneity Test	0.0395	0.0154	0.0265	0.0495	0.0028
Over Identification test	0.6341	0.6149	0.5225	0.7243	0.7903
D.W Test	2.29	2.52	2.54	2.68	2.65

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1.

Similar to RD and ED, the impact of composite decentralisation (CD) on economic growth can be estimated. In CD, revenue decentralisation and expenditure decentralisation reinforce each other. Table 8 presents the results obtained from GMM estimation. The impact of composite decentralisation on economic growth is positive and significant in all models. The positive association reveals that composite decentralisation (CD) is beneficial for Pakistan.

Table 8

The GMM Estimates: Dependent Variable (GDP per Capita Growth)

Variables	(1)	(2)	(3)	(4)	(5)
CD	0.0190*	0.0444***	0.0452**	0.0478***	0.0528***
	(0.0113)	(0.0166)	(0.0176)	(0.0159)	(0.0171)
OPN		0.0392*	0.0382*	0.0285*	0.0207
		(0.0218)	(0.0222)	(0.0158)	(0.0317)
T/GDP		0.0494*	0.0514	0.0692**	0.0837**
		(0.0273)	(0.0316)	(0.0276)	(0.0344)
HC		0.0519***	0.0532***	0.0403**	0.0455**
		(0.0162)	(0.0193)	(0.0157)	(0.0185)
INF			–0.0108**		–0.00713**
			(0.00517)		(0.00379)
BD				-0.0283***	–0.0330***
				(0.00821)	(0.00890)
Constant	0.0570***	0.0953	0.0940	0.218***	0.227***
	(0.0215)	(0.0610)	(0.0611)	(0.0665)	(0.0661)
Observations	37	37	37	37	37
R-squared	0.248	0.420	0.419	0.538	0.553
Wald Chi2 Test	2.85	10.48	11.69	33.15	39.10
J.B. Normality Test	0.91(0.63)	0.69(0.71)	0.69(0.71)	0.72(0.69)	0.81(0.66)
Endogeneity Test	0.0462	0.0733	0.0613	0.0548	0.0767
Over Identification test	0.7536	0.8955	0.9176	0.5239	0.5983
Durban Watson Test	1.88	2.39	2.40	2.55	2.68

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Numerous control variables have been used to estimate the impact of FD on economic growth. Tax to GDP ratio (T/GDP) has a positive and significant relationship with economic growth. This implies that the higher the tax to GDP ratio, the higher the GDP per capita growth. Trade openness (OPN) has a positive and significant impact on economic growth, implying that trade is beneficial for economic growth in Pakistan. The positive association of trade openness and economic growth is due to the benefits emerging from specialisation, competition and economies of scale. It is also due to productivity improvements made possible through the access to advanced technologies [Din, *et al*. (2003)]. Various empirical studies also provide evidence that trade promotes economic growth in Pakistan [Khan, *et al*. (1995); Iqbal and Zahid (1998); Din, *et al*. (2003)]. Human Capital (HC) has a positive and significant impact on per capita GDP

growth, implying that Pakistan could increase its per capita growth rate by investing more in human capital. This finding confirms the traditional view that the countries that invest more in their human capital do better in terms of economic growth. These results are broadly in line with the other studies that have found a positive association between human capital and economic growth in Pakistan [Abbas (2001); Abbas and Foreman-Peek (2008); Qadri and Waheed (2011)]. Inflation has a negative and significant impact on economic growth, implying that inflation hurts the growth process. A negative and significant relationship between budget deficit and economic growth has been found.

6.1. Role of Democratic Institutions

The literature suggests that FD may positively affect economic growth in the presence of strong democratic institutions. In order to check the role of institutions in FD process, the interactive term of democratic institutions is added. Neyapti (2004, 2010) similarly suggests the use of expenditure decentralisation with other institutions, such as central bank independence, local accountability, and governance quality, to test for the effectiveness of expenditure decentralisation. In Table 9, democratic institutions and interactive term of democratic institutions is added with FD.

Table 9

The GMM Estimates: Dependent Variable (GDP per Capita Growth)

	(1)	(2)	(3)	(4)
RD	0.00426		0.0271	
	(0.0117)		(0.0194)	
ED		–0.117***		–0.151***
		(0.0305)		(0.0387)
INS	0.00117**	0.00150*	0.000813*	0.00162*
	(0.000491)	(0.000836)	(0.000492)	(0.000894)
RD*INS	0.0132***		0.00914**	
	(0.00330)		(0.00412)	
ED*INS		0.0449***		0.0446***
		(0.0129)		(0.0156)
OPN			0.0463	0.00304
			(0.0369)	(0.0506)
T/GDP			0.0409*	0.0205
			(0.0246)	(0.0268)
HC			0.0397**	–0.0150
			(0.0164)	(0.0138)
Constant	0.0450*	–0.0546**	0.108*	0.00899
	(0.0231)	(0.0245)	(0.0614)	(0.0606)
Observations	37	37	37	37
R-squared	0.250	0.240	0.318	0.224
Wald Chi2 Test	29.18	33.54	51.22	29.00
J.B. Normality Test	1.02(0.60)	0.17(0.91)	0.45(0.80)	0.23(0.89)
Endogeneity Test	0.0376	0.0064	0.0144	0.0012
Over Identification test	0.6695	0.8442	0.6302	0.5745
Durban Watson Test	1.93	2.24	2.36	2.29

Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

The interactive term of revenue decentralisation and expenditure decentralisation with democratic institutions has a positive and significant impact on economic growth implying that FD and democratic institutions are complemented by each other. However, Brambor, *et al*. (2006) shows that it is incorrect to decide on the inclusion of the interactive term simply by looking at the significance of the coefficient of the interactive variable. The marginal effect of FD on economic growth should be observed by constructing confidence intervals for the estimates of coefficient of ED and interactive term of ED and institutions over the possible values of the institutions. Similarly for RD, if the interval lies above the zero line, then the effect is significantly positive and vice versa. Through this, the range of institutional values for which the effect of RD and ED can be said to be significant, can be found.

Fig. 4. Determining the Range of Significance of the Marginal Effect of RD*INS (Dashed lines show the 95 percent confidence band)

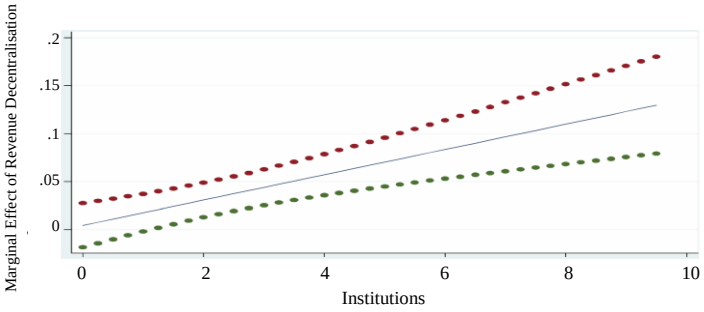
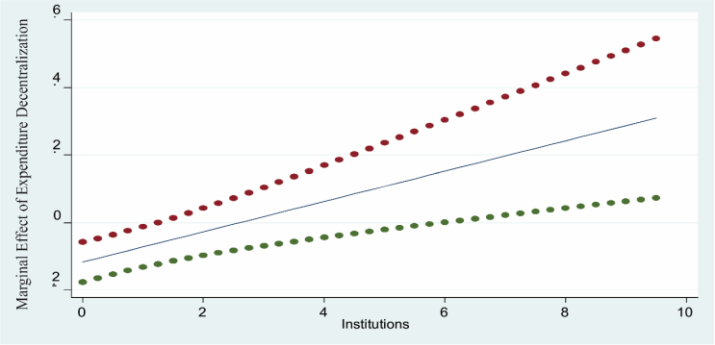


Figure 5 shows that with the low quality of institutions, the growth effect of expenditure decentralisation is negative. However, as the quality of institutions improves, the expenditure decentralisation exerts a positive impact on economic growth. The institutional school of thought argues that the quality of institutions increases the efficiency of the economic factors of production. It reduces the level of corruption and enhances the accountability of the governments.[6]

Fig. 5. Determining the Range of Significance of the Marginal Effect of ED*INS (Dashed lines show the 95 percent confidence band)



[6]See North (1981) for further elaboration on the role of institutions in economic growth.

7. CONCLUDING REMARKS AND POLICY IMPLICATIONS

In this study, the growth effects of fiscal decentralisation in Pakistan over the period 1972-2010 using the GMM estimation procedure have been analysed. The empirical analysis shows that revenue decentralisation is growth enhancing in Pakistan. Decentralisation of revenue generation responsibilities generates positive externalities which increase the per capita income of the country. On the other hand, it is found that expenditure decentralisation has a negative association with the growth rate of per capita income. This is mainly due to the low institutional quality which may increase the corruption level and make public officials less accountable. Lack of human and physical infrastructure may also lead to inefficient outcome of expenditure decentralisation in Pakistan. Composite decentralisation also has a positive association with growth mainly due to the positive effect of revenue decentralisation. This implies that if Pakistan focuses simultaneously on both types of decentralisation then it will be helpful in enhancing the per capita income. Only expenditure decentralisation is not helpful in achieving high and sustainable economic growth. The empirical analysis also reveals that the tax to GDP ratio has a positive association with economic growth. Trade openness has positive linkages with the growth rate of per capita income in Pakistan. Human capital also positively influences economic growth. Analysis reveals that FD becomes effective in the growth process if it is complemented with good quality institutions. It is observed that the interaction of expenditure decentralisation and revenue decentralisation with democratic institutions has a positive impact on economic growth.

Few policy implications emerge from the empirical analysis:

(i) The tax to GDP ratio has a positive association with economic growth. This finding has important implications for Pakistan. In Pakistan the tax to GDP ratio is very low as compared to other developed and developing countries. Due to a low tax base, Pakistan is consistently facing the problem of a high budget deficit. Increasing the tax to GDP ratio has two advantages: firstly, it directly contributes to economic growth and, secondly, it mitigates the negative impact of budget deficit on economic growth through reducing budget deficit. In Pakistan the main source of tax is the general sales tax on goods and services (GST) which is non-distortionary in nature. Taking into account the growth and stability effect of taxation, there is a need to further broaden the tax base and tax rates. To widen the tax base, all sources of income—including services, real estate and agriculture—must be brought under the tax net. The implementation of the Reformed General Sales Tax (RGST) can be an option for increasing the tax base and tax revenue. Implementation of RGST is essential to fully tap the revenue generation capacity as well as to help the documentation process in the economy.

(ii) The process of fiscal decentralisation, especially revenue decentralisation, is beneficial for the economy of Pakistan. To achieve long term economic growth, revenue decentralisation should be better streamlined through making the provinces more reliant on their own resources. The positive association of revenue decentralisation with economic growth has an important implication for the design of fiscal decentralisation in Pakistan because the process of restructuring government (which began with the passage of 7th NFC ward and

18th Constitutional Amendment) is in the early stage. This requires a serious effort both in terms of strengthening the institutions and promoting fiscal decentralisation to achieve the objective of better economic growth. The benefits of fiscal decentralisation can only accrue when provincial governments have a real fiscal autonomy, adequate accountability and sufficient capacity to respond to the local requirements.

(iii) Expenditure decentralisation can only be effective when the provinces have sufficient administrative capacity and have been made accountable and transparent through good institutions. The expenditure decentralisation can make positive contribution to economic growth if steps are taken to improve the administrative capacity of the provincial governments. This requires initiating programmes that provide technical and administrative skills to the public officials at the provincial level. These programmes are more likely to enhance the spending management skills of the provincial governments.

(iv) The present initiatives taken by the government in strengthening the provinces through providing more autonomy and resources have a clear implication for Pakistan's long term economic prosperity and macroeconomic stability. However, the outcome of these reforms crucially depends upon the institutional framework of the country. Strengthening of democracy is a pre-requisite for achieving the fruits of fiscal decentralisation.

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Attitudes Towards Women's Rights to Inheritance in District Lakki Marwat, Pakistan

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This paper analyses the effects of various economic, demographic and social factors like marriage practices, education and awareness on the beliefs and attitudes regarding women's rights to inheritance, ownership and management of property in Pakistan. Based on a random sample of 507 families from district Lakki Marwat, a backward northern district of Pakistan, the study finds that education level of respondents, including religious education, awareness of law and formal sources of information regarding women's rights are the main factors shaping respondents' perceptions about women's right to inheritance, ownership and management of property. The other factors like economic status, family demography and marriage practices appear relatively less important.

1. INTRODUCTION

Transfer of wealth from old to young generations through inheritance provides an important source of wealth to the young and the middle-aged. These transfers often constitute a major source of earning and old-age security in the form of home ownership in poor countries where formal social security networks at national level are almost non-existent and capital markets are imperfect. Inheritance also provides a potential source of investment in education for children who become orphans at an early age. Even if it is assumed that parents accumulate wealth only for their own old-age consumption, as the theory of life cycle claims, and have no particular desire to leave something to their children, the latter will probably still receive an inheritance.

Different societies have evolved their own social norms and practices in transferring wealth from old to young generations. In certain societies inheritance is a simple matter of transferring legal possessions of deceased persons to their descendants. According to traditional tribal customs in Pakistan, sons tend to enjoy the right of receiving almost all the assets left by their parents, while women generally do not receive or are obliged to surrender their legal share in inheritance. Being daughters, women are often also expected to forego their rights to inheritance in favour of their brothers. Their claim to get their inherited share in property may result in their desertion by their parental side. All this is mostly done and justified in the name of preserving inherited land, an important source of income and the symbol of power. Dowry is often treated as the daughters' share in inheritance which obviously, in most cases, is not equivalent to legal

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inheritance, but customary practices are binding on women to acquiesce. Moreover, women are told that their brothers are going to take care of them and the gifts given to them on different occasions are considered their share in property.

All these practices are quite contrary to the prevalent state law and clear guidelines given in Islam that prescribe well-defined shares for the male and female descendants of a deceased person. The Quran clearly states: "Men shall have a share in what parents and kinsfolk leave behind, and women shall have a share in what parents and kinsfolk leave behind." (*Quran*, 4:7). Women in Pakistan do have the legal right to inherit family's wealth, yet they rarely exercise their rights. Although Islamic law (*Shariah*) and Pakistan's state law both entitle women to inherit immovable and movable property, the practice has been to deny women their share in inheritance, particularly if it is land in which case their entire claim would often be denied. [Mehdi (2002)]. This is especially true in rural Pakistan, where the tribal nature of social organisation undermines inheritance rights.

Based on Islamic law, state law stipulates the share of women's inheritance to be one-half of that of men in similar relationships to them (e.g., a daughter would inherit one share for every two shares that a son inherits) due to the man's greater responsibility for supporting the family. Inheritance is governed by Islamic *Shariah* as codified in the Family Laws Ordinance 1961 [Mumtaz (2006)]. Due to the powerful force of customary practice in the country, however, the inheritance rules most often followed are those based on custom. Women in rural areas in particular rarely receive their shares in immovable property. When women do inherit property, it is typically controlled by male heirs [Mehdi (2002)].

The present study is carried out to analyse a number of potential factors that can be associated with the attitudes towards inheritance, property ownership and property management by women in Lakki Marwat, one of the less developed districts of Pakistan located in the province of *Khyber Pakhtunkhwa* (KPK). The study is based on a field survey containing both quantitative and qualitative data, which can explain the relationship of women's rights to inheritance and control over property with various socioeconomic and demographic variables.

The study considers four variables representing society's attitude towards recognising and accepting women's rights to inheritance, ownership and management of their properties. These are based on the respondent's intentions to give daughters their legal shares in inheritance and their views on whether women should be given their legal shares in inheritance; whether women should keep their property in their own names and whether women should have authority to manage their property.

The potential correlates of the attitudes towards women's rights to inheritance are the family's economic status, size and gender composition, registration of births, marriage type, pre-marriage relationship with spouse, education, religious orientation, awareness about women's rights to inheritance and the source of information about women's rights. These correlates are expected to have direct or indirect influence over the society's attitudes towards women's right to inheritance.

The study is organised as follows: Section 2 provides a brief review of the status of women regarding ownership and management of property. Section 3 provides the analytical framework and construction of variables. Data and brief descriptive analysis

are presented in Sections 4. Econometric analysis of the relationship of each of the four variables describing society's attitude towards recognising and accepting women's rights to inheritance, ownership and management of property is carried out in Section 5. Finally, Section 6 concludes the study.

2. STATUS OF WOMEN IN PROPERTY OWNERSHIP AND MANAGEMENT

In Pakistan, especially in rural areas, land as an asset is considered as the basic physical resource to provide food, employment, living space, economic security and social status. Less than half of rural households own agricultural land and 40 percent of the land is owned by 2.5 percent of households. In rural Sindh, landlessness is most acute with two-thirds of rural households not owning any land and just 0.4 percent of households accounting for nearly 24 percent of the total land area [Mumtaz (2006)].

According to Kamal (1999), male relatives tend to have actual control of property even where women own property. Often women can dispose of their property with household consent only and all buying and selling is done by male members of households. Statutary and Islamic laws, however, provide that a woman has the right to acquire, hold and dispose of property. The study mentions that another widespread practice is of forfeiting of inheritance share by women in favour of their brothers or sons, often through force or social pressures. In the absence of protective measures, women generally rely on the parental home and brothers in times of need (bad marriage, illness, economic pressure, etc.) and, therefore, forgo their share in property as insurance for the future.

Mehdi (2002) reports several cases in which women's names are registered in the property transfer papers on inheritance, but in practice, they do not get it. The understanding is that brothers would take the land, and the sisters would receive shares of the harvest or gifts. In rural Punjab, it is also not uncommon for brothers to enter into an understanding with the *patwari* (land revenue official) not to include their sisters' names among owners under the pretext that they, the sisters, have surrendered their shares. Otherwise, as soon as a woman's name is entered in the transfer papers, a gift is made in favour of the brothers. The study also mentions the extreme practice of *haq-bakhshwana* (explicit giving up of rights) whereby girls are either never married, or are 'married to the Quran' as in southern parts of Punjab (Multan and Bahawalpur) and Sindh in order to prevent property going out of the family. Similarly, cousin marriages and exchange marriages whereby one set of brother and sister are married to another set are designed to prevent break up of property as the size of land and property is associated with power and status.

One explanation for such discriminatory practices often cited is the adherence to age-old traditions and cultures. Women are said to be lacking in information about legal, economic or political rights. They are considered vulnerable to violence due to absence or lack of access to protection and justice. They are also considered to have restricted mobility. An important barrier for women is their lack of knowledge about their property rights and limited understanding of land registration systems, transaction procedures and other legal matters involved in possession of land.

Tirmazi (1999) regards women's lack of mobility as a barrier to their access to property and freedom to manage the property if they happen to own it. The excuse often

made, especially in South Punjab, is that women are not supposed to leave the home without *purdah* (seclusion) to physically own and manage property. This is despite the observation that women are expected to leave the home to fetch water from far flung areas for home consumption. Tirmazi (1999) asserts that women are relegated to work as service providers, but they are not considered responsible enough to own and control property and make important decisions related to it. This behaviour is not confined to Pakistan. Bennett (1981) has found that only less than two percent of all titled land around the world is owned by women, which shows worldwide gender-based inequity practices that reflects on the women's state of economic wellbeing. In its extreme form this type of discrimination can restrict the women's ability to acquire even the minimum means of survival.

Owning property provides a hedge against risk for women. According to Agarwal (1994) in South Asia the bargaining position of women is significantly affected by the amount of assets they own. This means that in seeking gender equality and justice the right to inheritance can be used as an effective tool. Agarwal (1998) finds that in rural India women tend to be economically and socially vulnerable and have limited range of choices for livelihood because of their limited access to own and manage property. Deere and Leon (2001) observe that property ownership lends women numerous advantages, especially in late years of life.

Some cultures consider dowry as a substitute for inheritance, which is not necessarily a fair practice. Dowry is given as a favour, while inheritance is received as a right. According to McCreery (1976), for example, women given dowry in China do not enjoy the same rights and privileges that are associated with inheritance. Similarly, Brown and Chowdhury (2002) find that only few women in rural West Bengal own agricultural land and even the house where they live, while dowry is a commonly practised alternative to inheritance.

Analysing intergenerational land transfer practices in West Ghana, Quisumbing, *et al*. (2004) find that the growing demand for female labour due to rising intensity of land utilisation had a favourable effect on ownership and management of land by women. In contrast, Matashane and Marite (2005) find that in Lesotho despite various rural development measures especially targeting women's empowerment, women remain subjected to discrimination when it comes to inheritance of agricultural land.

Deere and Leon (2003) find that in Latin America the inequality in land holdings between men and women remains significant. The study attributes this inequality to preferential treatment of men in society, marriage traditions that favour men and men-biased government's land distribution schemes. The study also finds that gender inequality in land holding is followed through generations because of the prevalence of parallel inheritance channels by which men tend to bequeath to sons while women bequeath to daughters. This is despite the observation that women land-owners play greater role in decisions regarding household consumption and farm production. A different form of gender-based intergenerational transfer of wealth has also been observed in the Philippines by Estudillo, *et al*. (2001). The study finds that educated fathers tend to transfer wealth to sons both through investment in their education and ownership of land, while mothers prefer direct transfer of land to daughters. The study, however, observes that this form of gender discrimination is declining among younger generations.

3. THE MODEL

The above review of previous literature shows that there are various aspects of gender discrimination in the way intergenerational transfers are carried out. In order to capture the multidimensional nature of the issue, we consider four specific variables that indicate gender-biased attitudes regarding intergenerational transfer. These variables are: (a) intention to give legal share in inheritance to daughters, (b) opinion regarding whether women should be given their legal share in inheritance, (c) opinion regarding whether women should own property in their name, and (d) opinion regarding whether women should be given authority to manage their property. Each of these questions has binary answers of yes or no. Thus, we construct binary variables assigning the value of one to 'yes' answers and zero to 'no' answers.

The first variable indicates whether the respondents intend to give their daughters their legal shares in property. Since respondents are likely to avoid a direct question, they are asked to pick one of the four responses, which are: (a) intend to give legal share to daughters in property; (b) intend to give dowry to the daughters rather than their legal share; (c) intend to give gifts to daughters rather than their legal share in inheritance; and (d) intend to compensate daughters in other forms in place of their legal share in property. Only the first option is considered as yes response, while the other three options are regarded as no response. The second variable is aimed to assess the respondents' belief rather than their intention. The analysis of these two variables, which represent intentions and beliefs, would indicate whether intensions differ from beliefs due to social norms and pressures. The third and fourth variables assess the respondents' general opinion on whether or not women could have the right to formally own and manage property. Answers to these questions would indicate whether women are denied their legal inheritance rights only or are they also discouraged from owning and managing property in general.

The study considers five categories of independent variables, which are likely to influence their attitudes regarding women's rights to inheritance, ownership and management of property. These are: (a) economic variables, (b) demographic variables, (c) variables concerning marriage practices, (d) education related variables, and (e) awareness variables.

The economic status of respondents is measured by income and assets. Income includes wages and receipts of interests, rents and other forms of net transfers. Assets are measured in terms of financial assets plus the current market value of all physical durables net of liabilities. On prior basis we do not pose any hypothesis regarding the nature/direction of relationship of the dependent variables with income or assets. Richer respondents may be more generous to daughters if they consider the son's wellbeing a necessity and daughter's wellbeing a luxury. Or in simple terms, they may value the daughters' wellbeing after ensuring a certain minimum level of wellbeing for the sons. On the other hand, the relationship could be reversed if respondents considered the son's wellbeing a 'normal good' and the daughter's wellbeing an 'inferior good'.

The first demographic variable i.e., family size captures various aspects. It is expected that in smaller families the generation gap is narrower and, hence, parents would be more inclined to give daughters their due shares in property. Furthermore, for the given amount of assets, smaller families would have better economic status. Thus, family size will matter if the respondents' attitudes towards daughters' rights are related to their economic status.

The number of sons and daughters can also affect parents' attitudes. In families with more sons parents can favour them at the cost of daughters to provide them with better economic security assuming that economic security of the daughters is the responsibility of their husbands. Similar considerations may apply where there are more daughters as giving legal share to the daughters would mean smaller share left for the sons. During the survey for this study, it was observed that a few parents having just one daughter intended to give her legal share in inheritance because it would not cost much to the sons and parents tend to love a lone daughter amongst several sons. Another observation was that daughters are often refused their share in property because it will divide the family's property and reduce its economic status. If this be the case, then the same argument can be applied to division of property among sons. Therefore, on this particular basis, gender discrimination can be explained only when there is just one son and therefore non-division of property would imply giving all the property to him. It follows from this discussion that it is the absolute number of sons and daughters, rather than their relative numbers, that matters.

Since official registration of births is considered as the main legal proof of the identity of a child, the parents who do not register the births of their children may find it easier to discriminate against their daughters in the distribution of inheritance wealth. Thus, the percentage of births officially registered may have some relationship with parents' attitudes towards the daughters' rights to inherit property.

With the projection of progressive and liberal thought through the global media, it is expected that in recent years people should have become more aware about the importance of giving women their rights and independence. This means that in a cross section of respondents, the younger ones are more likely to recognise the rights of women with regard to their due share in inherited property and authority in making their own economic decisions. To capture this factor we include the age of the respondent as a potential independent variable.

The status of marriage is another factor considered that can affect attitudes towards women's rights to inheritance. Denial of women's right to inheritance is often practised in the form of implicit contract in exchange marriages (A brother and sister marry another set of siblings) whereby women of the two families are denied their inheritance rights to yield zero inter-family transfers of assets. Thus, women in exchange marriages are less likely to get their rightful shares in inheritance. A somewhat weaker form of this practice is marrying within families. Here we consider three categories; cousin marriage, marriage with other relatives and marriage with non-relative.

The education level of respondents can also influence their attitudes towards women's rights. We classify education into five levels from illiterate to higher education. In addition, we also consider religious education as another factor that can potentially affect attitudes towards women's property rights. The respondents with higher levels of formal and religious education are more likely to be fair in recognising and accepting women's rights to inheritance and ownership of property.

The last set of factors pertains to the respondents' awareness in respect of women's rights. In this regard we consider various variables representing the state of the respondents' awareness and the sources of their information about women's rights. The

inheritance laws in Pakistan have been prepared in accordance with the detailed instructions in the Holy Quran about the inheritance rights of wives, sons, daughters, brothers, sisters, parents and other relatives of a deceased person under various circumstances. These instructions are very elaborate and clearly mention women's rights to inheritance. It can be expected that the respondents who understand the contents of the Quran would recognise and accept women's rights to inheritance and ownership of property. This justifies the inclusion of the first awareness variable, 'understanding of the contents of Quran'. A more specific variable in this context is the respondents' awareness about Islamic laws of inheritance. Finally, another variable considered is the respondents' awareness about the country's inheritance laws.

Although the country's laws on inheritance are based on Islamic laws, the two laws pose different type of deterrence, one in the form of punishment by man-made institutions and the other in the form of punishment by divine authority. Thus, how one reacts to the two types of perceived risks will depend on one's sense of civic responsibility and one's level of understanding of religion. It is expected that the respondents who are aware of any of these two types of inheritance laws are more likely to recognise women's rights to inheritance and ownership of property.

It is also important to analyse the role of various sources of information that make people aware of women's rights. In this connection, we consider four sources, which are formal religious sources, formal education, media and parents/elders. Awareness obtained through formal religious sources, education and media is likely to be relatively more effective in shaping the respondents' attitudes towards women's rights to inheritance and ownership of property. As to the relative effectiveness of the three sources, we do not pose any prior hypothesis and leave the matter to empirical results. Table 1 summarises the above descriptions of variables.

As should be clear from the nature of research problem at hand, our analytical framework involves binary options. In one case the binary options are regarding the choice between one of the two intended actions, that is, to give or not to give daughters their legal shares in inheritance. In the other three cases the binary options involve one of the two opinions, one in favour and the other against daughters regarding their right to inheritance, ownership of property and management of property. In either case the dependent variable can take only two binary values: one or zero. Obviously, in this situation linear regression models are unsuitable. Therefore we consider two non-linear models, which are logistic and Probit models.

Denoting observation i on the binary dependent variable by Y_i, the row vector of observation i on explanatory variables by X_i and the column vector of the regression parameters by β, the two models for the determination of the binary variables considered in Table 1 can be represented as follows:

Logistic Model: $$Y_i = \frac{e^{X_i\beta}}{1+e^{X_i\beta}} + U_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

Probit Model: $$Y_i = \int_{-\infty}^{X_i\beta} (2\pi)^{-\frac{1}{2}} e^{-z^2} dz + U_i \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (2)$$

Table 1

List and Description of Variables

Description	Variable Type/Unit	Notation
Attitudes Towards Women's Property Rights (Dependent Variables)		
Intention to give daughters legal share in inheritance	Categorical: yes/no	*Intention_share*
Should women be given legal share in inheritance	Categorical: yes/no	*Opinion_share*
Should women own property owned in their names	Categorical: yes/no	*Opinion_ownership*
Should women be allowed to manage their property	Categorical: yes/no	*Opinion_management*
Family's Economic Status		
Monthly family income	Thousand rupees	*Income*
Net family assets	Million rupees	*Assets*
Family's Demography		
Number of family members	Count	*N*
Number of sons	Count	*N_sons*
Number of daughters	Count	*N_daughters*
Percentage of births in family registered officially	Percentage	*Birth_registration*
Age of respondent	Years	*Age*
Respondent's Marital Background		
Exchange marriage	Categorical: yes/no	*Marriage_exchange*
Respondent's state of marriage: Cousin marriage, marriage with other relative	Categorical: yes/no	*Marriage_cousin, Marriage_family*
Respondent's Education		
Education level: 0-4 years, 5-7 years, 8-9 years, 10-15 years, 16 or more years and religious education*	Categorical	*Edu_Illiterate, Edu_Primary, Edu_Middle, Edu_College, Edu_Higher, Edu_Religious*
Respondent's Awareness on Women's Rights		
Understanding of the contents of Holy Quran	Categorical: yes/no	*Understanding_Quraan*
Awareness of Islamic laws of inheritance	Categorical: yes/no	*Aware_Islamic_law*
Awareness of country's laws of inheritance	Categorical: yes/no	*Aware_Country_law*
Source of information on women's rights: Religious sources, education, media and parents/elders	Categorical: yes/no	*Inf_religion, Inf_education, Inf_media, Inf_parents/elders*

*There are four levels of religious education. Qari is a person who can recite Holy Quran with correct pronunciation. Hafiz is a person who has memorised the complete Holy Quran. Munshi Fazal is a formal certificate of education in religion, while Alam Fazal is a higher certificate in religious education.

For X variables we use the independent variables listed in Table 1. Both the models are estimated by standard methods of estimation for non-linear equations following the ML principle. Once the models are estimated, the probability derivatives or marginal effects with respect to various X-variables are obtained as follows, where bar on X indicates the vector of sample means and hat on β indicates the vector of estimated parameters.

Logistic Model: $$\frac{\partial \hat{Y}}{\partial X} = \frac{e^{\bar{X}\hat{\beta}}}{\left(1+e^{\bar{X}\hat{\beta}}\right)^2}\hat{\beta} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

Probit Model: $$\frac{\partial \hat{Y}}{\partial X} = (2\pi)^{-\frac{1}{2}} e^{-(\bar{X}\hat{\beta})^2}\hat{\beta} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4)$$

In the first round we will estimate the models with all the independent variables listed in Table 1. However, it is understood that not all the explanatory variables will turn out to be statistically significant. Therefore, we will apply the Wald tests for the joint significance of various sets of variables such as economic variables, demographic variables, etc. In addition, we will also follow general-to-specific (step-wise backward elimination) procedure to arrive at the final regression estimates.

4. DATA AND DISCRIPTIVE ANALYSIS

For empirical analysis a sample of respondents is collected from district Lakki Marwat, *Khyber Pakhtunkhwa* (formerly North West Frontier Province), Pakistan. The district is characterised by agrarian economy and very low level of literacy among women. According to the 1998 census [Pakistan (1998, 2000)], the district has a population of 490025 residents, 90.43 percent of whom live in rural areas. The district has an area of 3,164 square kilometers. The literacy rate is 50.3 percent among male and only 8.6 percent among female population. The average family size is 9.2 persons per unit and the total units are about 53302.

Most of the people in this region are Sunni Muslims and most young and old men go to mosques for prayers five times a day. The majority of people are farmers, while a considerable number of young people are engaged in government and private services (e.g. banking, education, medical, shop keeping and other small businesses). Agriculture plays an important role in sustaining the economy of the district.

The custom in the arrangement of marriage is to pay money to the guardian of the girls. Educated and upper class people, however, do not insist on monetary payment. There is always some secrecy about the amount settled to be paid and an element of shame attached to the contracts, should knowledge about a transaction becomes public. Boys and girls are not betrothed until they attain puberty. Girls in towns as well as in the villages start wearing veil when they are 10–12 years of age.

Lakki Marwat district consists of two tehsils (administrative units), namely Lakki Marwat and Sarai Naurang and 36 union councils (administrative sub-units). Using random numbers, these union councils were sorted in arbitrary order and the first 10 union councils were selected. From each union council one village/suburb was selected randomly and from each village approximately 50 families were selected using a mix of convenience, random

and judgment sampling. This resulted in an overall sample size of 507 families. For the obvious reason only such potential respondents were selected who had both daughters and sons. The distribution of the sample by regions is shown in Table 2.

Table 2

Region-wise Frequency Distribution of the Sample

	Lakki Marwat			Sarai Naurang			
Units	Urban	Rural	Total	Urban	Rural	Total	Total
Union Council	–	–	7	–	–	3	10
Families	102	255	357	50	100	150	507
	(29%)	(71%)		(33%)	(67%)		

The head of each selected family was requested to provide oral information according to a pre-specified questionnaire. To help interpret the statistical results of the study, group discussions were carried out in five villages where the respondents were willing to spare time.

The respondents' opinions about recognising women's rights to inheritance are recorded and analysed both qualitatively and quantitatively. The data and group discussions reveal that women's rights regarding access to and control over land, housing, and property are important in determining their overall living conditions, economic security and even physical safety. The recognition of women's rights to inheritance is also accepted as a serious social consideration. Table 3 provides the most basic statistics.

Table 3

Respondents' Attitudes Towards Women's Property Rights

	Recorded Responses		
Question	Yes	No	Total
Will you give your daughters their legal share in property?	66	441	507
	(13.02%)	(86.98%)	
Should women be given their legal share of inheritance?	313	194	507
	(61.74%)	(38.26%)	
Should women own property in their name?	239	268	507
	(47.14%)	(52.86%)	
Should women be given authority to manage their property?	34	473	507
	(6.71%)	(93.29%)	

The data in the table—specifically the two middle rows—, along with discussions with respondents show that the majority of respondents recognise women's rights to inheritance and almost half of them also acknowledge women's possession of property as their right but when it comes to management of the property, a vast majority believes that the women should not be given the right to manage their own property. The majority also do not intend to give their daughters their legal shares in inheritance. The apparently contradictory responses arise partly due to cultural constraints and lack of confidence in women's ability to manage property. The majority of respondents consider ownership of property as a source of protection and security to women in times of emergency.

However, it is generally accepted that women are incapable of managing and dealing with matters relating to property and legal issues as they lack sufficient understanding of the law regarding property. Based on this general perception related to land management by women, respondents seem to be reluctant to give women their rights to inheritance on customary grounds. Thus, an overwhelming majority of the respondents believe that it is difficult for women to manage property on their own and, hence, do not intend to act on their positive attitudes towards daughters.

Extensive discussions with the respondents reveal that many of them do not intend to act on their beliefs due to social pressure or other considerations. In particular, quite a few respondents believe that women should be given their due share in property but they do not intend to act on this belief due to perceived difficulties in management of the property that women are expected to face in the so-called 'men dominated society' and pressure of other family members, especially elders of the family and wives. However, a common observation is that men are reluctant to put their economic power at stake by giving women their due right to inheritance. Considering the views about the reasons for not giving the due right to women in inheritance, it is found that 58 percent of the respondents believe that if women are given property in their name, it would lead to disputes in the family. Another 30 percent argue that women do not need property in their name and about 12 percent respondents blame women's mental capability in handling property.

It is also observed that a majority of the respondents recognise women's rights to inheritance and almost half of the respondents also agree that women could be given legal possession of the inherited property, but only 7 percent believe that women should be given authority to manage the property. The majority of the respondents argue that it is the socio-cultural value system prevailing in society that makes it difficult for women to approach and interact with male officials for settling matters of their inherited property and consider this difficulty a hurdle for the women to manage their property. Here it can be concluded that the data endorse the recognition of women's right to inheritance and possession of property to some extent but do not endorse their right to exercise control over the property.

We now turn our attention to the estimation of quantitative relationships between various indicators of attitudes toward women's rights to inheritance and the selected independent variables on the basis of the observed data.

5. RESULTS AND DISCUSSION

Since the dependent variables are binary variables, we have estimated the probability function using the Logistic and Probit regression models. In order to avoid repetition, only the results of Logistic regression models are presented here, while the results of Probit models are placed in an appendix. In the regression results presented here we report the probability derivatives (marginal effects) estimated at the sample means and the corresponding t-statistics.

Following the framework given in Section 3, we estimate four different Logistic regression equations corresponding to the four binary variables (Equation 1). For the obvious reason for each categorical independent variable, one of the categories is excluded from the regression equation to serve as the reference category for comparison with the included categories. In the first round of estimation, quite a few independent variables turned out to be statistically insignificant. Therefore, in order to determine the

strength of the various sets of variables in explaining the models, we applied the Wald tests for joint significance of the corresponding parameters. In addition, to improve the quality of the estimates we also followed general to specific (stepwise backward elimination) procedure. In the first step, the original equations with all the variables specified in Table 1 are estimated. Then in each estimated equation the variable with the smallest t-statistic (most insignificant) of its regression coefficient is dropped and the restricted equation is re-estimated. Again the variable with the smallest t-statistic of its regression coefficient is dropped and the process is continued till all t-statistics are greater than one in absolute terms. In order to establish the robustness of the procedure, the variables dropped at the initial stages are included again in the equation at later stages. As it turns out, in no case could a variable dropped at the initial stage be included at a later stage, which confirms that the process of model specification has been robust.

The Wald test results are reported in Table 4. It is obvious from the table that not all sets of variables are jointly significant in all the four equations. The first set of variables, that is, economic variables namely income and assets appear to be statistically significant in determining whether respondents intend to give their daughter their due share in property and their opinion about whether women should be given their legal share in inheritance. On the other hand, the economic variable turns out to be insignificant in determining the respondents' opinion regarding whether women should own property in their names and whether they should be allowed to manage their property.

Table 4

Results of Wald Test for the Joint Significance of Parameters

	Dependent Variable			
Set of Independent Variables Tested	*Intention_ share*	*Opinion_ share*	*Opinion_ ownership*	*Opinion_ management*
Income, Assets	5.080*	2.470**	0.720	2.230
	10.160*	4.930**	1.440	4.470
N, N_sons, N_daughters, Birth_registration, Age	3.640*	1.840	3.450*	0.690
	18.200*	9.200	17.240*	3.440
N, N_sons, N_daughters	0.840	1.780	2.500**	0.520
	2.530	5.350	7.490**	1.560
Marriage_exchange, Marriage_cousin, Marriage_relative	0.110	2.490**	4.080*	0.900
	0.320	7.480**	12.230*	2.710
Marriage_cousin, Marriage_relative	0.160	3.690*	5.180*	1.200
	0.310	7.390*	10.360*	2.390
Edu_Primary, Edu_Middle, Edu_College, Edu_Higher, Edu_Religious	2.540*	2.350*	3.970*	2.100**
	12.700*	11.740*	19.870*	10.480**
Edu_Primary, Edu_Middle, Edu_College, Edu_Higher	3.140*	1.940	3.590*	2.610*
	12.580*	7.770	14.360*	10.440*
Understanding_Quraan	1.890	2.370	4.580*	0.170
	1.890	2.370	4.580*	0.170
Understanding_Quraan, Aware_Islamic_law	1.720	2.610**	3.830*	0.300
	3.440	5.220**	7.660*	0.610
Aware_Islamic_law, Aware_Country_law	0.850	2.550**	2.280	1.560
	1.710	5.110**	4.550	3.120
Aware_Islamic_law, Aware_Country_law, Inf_religion, Inf_education, Inf_media	2.010**	6.370*	2.800*	0.830
	10.040**	31.850*	13.980*	4.160
Inf_religion, Inf_education, Inf_media	2.530**	9.930*	3.740*	0.370
	7.590**	29.790*	11.230*	1.100

Note: The first value in a cell is the F-statistic, while the second value is Chi-square statistic. The statistics significant at 5 percent and 10 percent levels are indicated by * and ** respectively.

The demographic variables are significant only in determining whether the respondents intend to give daughters their legal shares in property and the respondents' opinion on whether women should have property in their names. The narrower set of variables consisting of the family size, number of sons and number of daughters is significant only in determining the respondents' opinion on whether women should have property in their names. Thus, the demographic variables do not appear to be much important in determining the respondents' attitude towards women's property rights.

Marriage related variables are jointly significant in determining the respondents' opinions on whether daughters should be given their legal shares in property and whether women should own property in their names. But the practices of exchange marriage and marriage with relatives do not affect significantly the actual intention of respondents for giving daughters their legal shares in inheritance and their opinion on whether women should be allowed to manage their property.

The results show that the education level of respondents including religious education is the most significant factor in determining their attitudes towards women's property rights. Education is found to affect all aspects of attitudes towards women's rights to inheritance, and the ownership and management of property.

Coming to variables representing the respondents' awareness about women's rights, we have tested several sets of variables. First, an important result is that respondents' understanding of Holy Quran and their awareness about Islamic and country's laws of inheritance do not affect significantly their intentions about giving the daughters their legal shares in inheritance, even though these awareness variables do matter in forming their opinions on women's rights to own property. On the other hand, respondents' attitudes seem to be affected by the source of their information about women's rights.

All in all, we conclude that none of the five categories of potential explanatory variables, that is, family's economic status and demography, state of respondents' marriage, respondent's education and respondents' awareness about women's rights, can be rejected altogether in the overall framework of analysis. However, the respondents' opinion on whether women should have authority to manage property is not much affected by any set of variables except the education level of the respondents.

Next, following the general to specific (stepwise backward elimination) procedure as outlined earlier, we obtained the estimates for the final selected Logistic and Probit regression models. The results of the Logistic model are presented in Table 5, while the results of Probit model are given in the Appendix Table A5. A detailed discussion of the results of the Logistic model proceeds as follows:

The overall performance of the estimated equations is satisfactory as indicated by the values of McFadden R-squared and Likelihood statistics. However, relatively low values of the McFadden R-squared in all the equations and the presence of significant intercepts in three equations indicate that some variables that could explain the variations in the dependent variables are missing from the specified model. But this is quite a common observation for behavioural models estimated on the basis of cross-section data.

Coming now to the role of individual variables, we observe that the economic status of the families, as indicated by the family's current income, serves as an important factor contributing to the respondents' favourable opinions regarding women's right to ownership and management of property.

Table 5

Results of Logistic Regression Models

	Dependent Variable			
Independent Variables	Intention_ Share	Opinion_ Share	Opinion_ Name	Opinion_ Manage
Intercept	-2.724	0.739	1.799	-3.556
	(-1.85**)	(1.28)	(2.65*)	(-2.89*)
	-0.163	0.169	0.448	-0.086
Income	-0.050	0.045		0.053
	(-1.58)	(2.39*)		(2.05*)
	-0.003	0.010		0.001
Assets	0.800		0.152	
	(3.23*)		(1.08)	
	0.048		0.038	
N		-0.134	-0.139	
		(-2.47*)	(-2.58*)	
		-0.031	-0.035	
Sons				0.162
				(1.10)
				0.004
Daughters	-0.304			
	(-1.64)			
	-0.018			
Birth_registration	0.024	-0.010	-0.009	
	(2.93*)	(-2.47*)	(-2.16*)	
	0.001	-0.002	-0.002	
Age	-0.087		-0.017	-0.034
	(-3.26*)		(-1.59)	(-1.29)
	-0.005		-0.004	-0.001
Marriage_exchange			-0.684	
			(-2.03*)	
			-0.170	
Marriage_cousin		-0.534	-0.881	-0.679
		(-2.44*)	(-3.24*)	(-1.47)
		-0.122	-0.219	-0.016
Marriage_relative			-0.557	
			(-2.09*)	
			-0.139	
Edu_Primary	1.158	0.702		
	(1.42)	(1.45)		
	0.069	0.160		
Edu_Middle	1.540	0.759	0.739	
	(2.52*)	(2.12*)	(2.28*)	
	0.092	0.173	0.184	
Edu_College	0.903	0.687	0.908	1.688
	(1.50)	(2.48*)	(3.27*)	(2.79*)
	0.054	0.157	0.226	0.041
Edu_Higher	5.229		2.495	3.501
	(3.03*)		(2.80*)	(3.93*)
	0.313		0.622	0.085
Edu_religious	3.697	2.218	2.778	0.855
	(2.11*)	(1.85**)	(2.81*)	(1.05)
	0.221	0.507	0.692	0.021
Understanding_Quran	-1.970	-0.645	-1.304	
	(-1.34)	(-1.21)	(-2.14*)	
	-0.118	-0.147	-0.325	
Aware_Islamic_law	0.850	-0.458	-0.433	
	(1.33)	(-1.70**)	(-1.66**)	
	0.051	-0.105	-0.108	
Aware_Country_law		0.679	0.400	0.856
		(1.86**)	(1.26)	(1.79**)
		0.155	0.100	0.021
Inf_religion	2.247	1.454	0.792	
	(2.76*)	(5.51*)	(3.00*)	
	0.134	0.332	0.197	
Inf_education	1.458	1.450	0.943	
	(1.26)	(2.63*)	(1.83**)	
	0.087	0.331	0.235	
Inf_media	1.827	1.261	1.334	1.060
	(1.33)	(2.33*)	(2.47*)	(1.22)
	0.109	0.288	0.332	0.026
McFadden R-squared	0.317	0.190	0.149	0.327
LR statistic	82.9*	128.2*	104.5*	81.5*

Note: The results show estimated regression coefficients, t-statistics and the estimated probability derivatives at sample means. The statistics significant at 5 percent and 10 percent levels are marked by * and ** respectively.

The opinions in favour of women's rights to inheritance and management of property are positively and significantly related to the level of family income. Although the respondents with higher current family income appear to be less likely to give their daughters their due share in property, the relationship is statistically insignificant. The improvement in economic status, as indicated by assets is positively (and somewhat significantly) related to the respondents' favourable attitudes towards women. For example, on average an increase of one million rupees in net assets would bring about 4.8 percentage points increase in the likelihood that a respondent would intend to give his daughters their legal share in property.

Turning now to demographic variables, the table shows that family size is an important determinant of respondents' attitude towards women's rights. The respondents with larger family sizes are less likely to believe that daughters should be given their shares in property and women may have property in their names. A possible interpretation is that, given the economic status of a family, the respondents belonging to larger families tend to believe that giving daughters their share in property would make all their offspring poorer. The belief is that since the daughters are supposed to be supported by husbands, it would be fair to ensure economic security for the sons, hence justifying reservation of inheritance wealth for sons only. It is important to note here that the family size does not affect the intention of giving daughters their due shares in property. Thus, even though the respondents with larger families tend to believe that daughters should not be given their shares in property, when it comes to intentions, family size appears to be a redundant variable. Discussions with the respondents indicate that this result does not mean that larger families with unfavourable opinions towards daughters do not intend to act on this belief. A more realistic interpretation is that even the smaller families having favourable opinion towards daughters do not intend to act on their beliefs. Social norms and prevalent practices come in their way to act on their beliefs, which are often not backed by strong convictions.

Against theoretical expectations, the number of sons and the number of daughters turn out to be 'redundant' except in only one equation each and in these equations the relationship is statistically insignificant. Thus, as already noted with reference to the results of the Wald test on joint significance of demographic variables, the number of sons and the number of daughters are not much important in determining the respondents' attitudes towards women's rights.

The next variable under consideration is the percentage of births registered with the local births and registration office. The results show that families that get the births of their children officially registered are more likely to give daughters their legal share in property even though they are less likely to have favourable opinions regarding women's rights to inheritance and ownership of property. This obviously means that the official registration of births, being the main legal proof of the identity of a child, makes it difficult for the parents to discriminate against daughters in the distribution of inheritance wealth.

The age of the respondent has negative regression coefficients in the three equations in which it appears and the regression coefficient is highly significant in the first equation. This shows that the younger respondents have more favourable attitude towards women. The probability derivative estimated at the sample mean shows that a 10 years younger respondent is five percentage points more likely to intend to give his

daughters their legal share in property and 4 percentage points more likely to view that women may keep property in their names.

All the three marriage related variables turn out to be redundant in, and hence dropped from, the first equation. The variable, however, has significant correlation with the three dependent variables describing the respondents' views on women's right to inheritance, ownership and management of their properties. The result shows that exchange marriages and marriages with cousins or other relatives tend to promote negative attitudes towards women's economic rights. For example, respondents having cousin marriage are about 12 percentage points more likely to view that daughters should not be given their legal shares in property and about 22 percentage points more likely to view that women should not keep property in their names. However, a vast majority of respondents do not intend to give daughters their legal shares in inheritance irrespective of whether they had exchange marriage or married within the family.

The level of education of the respondents appears to be the only variable which plays a significant role in all the four aspects of attitudes towards women's rights to inheritance, ownership and management of property. The most reassuring result is that the respondents with higher education attainments are more likely to give their daughters their legal share in property. For example a respondent with 16 or more years of schooling is 31 percentage points more likely to give his daughters their legal shares in property as compared to illiterate respondents. In addition, in all the cases reported in the table, the education level is also affirmatively correlated with the respondents' positive views towards recognising women's rights to inheritance, ownership and management of property. For example, as compared to illiterate respondents, those with 16 or more years of schooling are 62 percentage points more likely to view that a woman may keep property in her own name and 8.5 percentage points more likely to view that a woman may have authority to manage her property in her own name.

Education up to the middle or higher levels seems to be a critical variable in positive attitudes as seen in the table. Since about half of the sampled respondents (48 percent) have obtained middle or higher level of education, while only 3.75 percent have obtained 'higher' education, the overall position for women's rights to inheritance in the region does not appear much promising. This is particularly the case because the level of literacy is expected to be even lower in the region than revealed in the sample as quite a large number of potential respondents with little or no education could not understand or respond to many questions and were replaced by others.

Quite interestingly, religious education appears to be quite a significant factor in determining the respondents' attitudes towards women's economic rights. Specifically, the respondents with religious education are 22 percentage points more likely to give their daughters their due shares in property, 51 percentage points more likely to view that women should be given their legal shares in property and 69 percentage points more likely to view that women may keep property in their own names.

The final set of variables that we consider now is about the respondents' awareness about inheritance rights of women. The results show a surprising trend whereby the three awareness variables, namely understanding of the contents of Holy Quran and awareness of Islamic laws of inheritance and the country's basic laws of inheritance have no significant effect on the respondents' intentions to give their

daughters their lawful shares in property. As regards the relationship of awareness with respondents' opinions about women's rights, the results show mixed patterns. While understanding of Quran and awareness of Islamic laws of inheritance seem to have adverse effects on the respondents' opinions regarding women's rights, the respondents' awareness about the country's basic laws of inheritance contributes favourably to respondents' opinions about women's rights. Thus, the respondents seem to be influenced positively more by their awareness about the country's basic laws than by their awareness about religion. A possible reason that could explain this behaviour may be that the respondents who are aware of the Islamic laws of inheritance have tendency to over-value rights of men against the rights of women because according to Islam women do not have equal status in inheriting property or giving witness in a court of law. Thus, while Islam defines, recognises and emphasises on adhering to women's rights, men are likely to misinterpret its teachings to economically discriminate against women. However, a reassuring result is that the respondents having acquired formal religious education tend to have highly favourable attitudes towards women. This means that mere awareness is not sufficient; one also has to have deeper understanding of religion to recognise the place of women in social order.

We now consider the last three variables, which relate to the sources of respondents' information about women's inheritance rights. The results show that all the formal sources of awareness, that is, religion, education and media, as compared to informal source of awareness through parents and elders, play an important role in the recognition and acceptance of women's rights to inheritance, ownership and management of their property. For example, the respondents who have become aware of women' inheritance rights through media are 11 percentage points more likely to intend giving their daughters their due shares in inheritance, 29 percentage points more likely to view that women should be given their lawful shares in property and 33 percentage points more likely to view that women may keep their property in their own names.

It is important to note that the respondents who claim that they have obtained information regarding women's economic rights through former religious sources are more likely to give their daughters their due shares in inheritance and recognise women's rights to inheritance and ownership of property and the difference is highly significant in all the three cases. This result combined with the observed significant role of religious education and the insignificant or adverse effects of the understanding of Quran and awareness of Islamic laws of inheritance means that religious teachings can shape the respondents' attitudes towards women's right provided such teachings are acquired directly from the authentic sources such as the Holy Quran. It is, therefore, important to emphasise here that awareness is a subjective concept and those who think they are aware, may not in reality be aware properly unless the source of information is undisputed like the direct reading of the original source material.

The respondents' knowledge of Islamic teachings on women's rights is not effective in shaping the respondents' attitudes unless the knowledge is acquired directly from formal religious sources and backed by formal religious education.

6. SUMMARY AND CONCLUSION

This study has been carried out to estimate and analyse the contribution of various economic, demographic, and social factors that can potentially affect the beliefs and attitudes prevailing in society regarding women's rights to inheritance, ownership and management of their property. The study is based on a sample of 507 families collected through a field survey in District Lakki Marwat, a backward district dominated by rural population, agrarian economy and low literacy of women. The district is located in the province of *Khyber Pakhtunkhwa* (KPK), Pakistan. The sample is selected through a stratified random sampling procedure covering various locations as well as rural urban divide of the district. The study uses both qualitative as well as quantitative data, which explain the relationship of the respondents' attitudes towards women's rights to inheritance and their control over property with various socioeconomic and demographic variables. For a formal analysis the study uses Logistic and Probit regression models.

The study arrives at several interesting conclusions. The economic status of families appears to be quite relevant in the given context. The results show that in most cases improvement in economic status of families is positively and significantly correlated with respondents' favourable attitudes towards women. The respondents with larger family sizes and/or lower level of wealth are less likely to believe that daughters should be given their shares in property and women may have property in their names. A possible reason is that other things held constant, the respondents belonging to larger families or having lower stock of wealth tend to believe that giving daughters their share in property would make all their offspring poorer. The belief is that since the daughters are supposed to be supported by husbands, it would be fair to ensure economic security for the sons, justifying sole inheritance rights of the son. It is important to note here that family size does not affect the intention of giving daughters their due shares in property. Thus even though the respondents with smaller families tend to believe that daughters should be given their shares in property, they still do not intend to act on this belief, indicating that social norms and prevalent practices come in their way when they are to act on their beliefs, which are often not backed by strong convictions.

The study finds that persuasion of families for regular official registration of births can be instrumental in letting women obtain their legal shares in inheritance. Another expected result is that the respondents belonging to younger generation have relatively more favourable attitude towards women in recognising their rights to inheritance, ownership and management of property.

A useful result is that the respondents with higher education attainments are more likely to give their daughters their legal shares in property. In addition, education level is also positively correlated with the respondents' positive views towards recognising women's rights to inheritance, ownership and management of property. Religious education also comes out to be instrumental in promoting positive attitudes towards women's rights to inheritance.

An unexpected result found in the study is that the awareness of the respondents in terms of understanding the Holy Quran and the knowledge of Islamic laws of inheritance have no significant effect on their intentions to treat their daughters fairly in the distribution of inheritance wealth. On the other hand, the respondents' awareness about the country's basic laws of inheritance contributes favourably to respondents' opinions

about women's rights. A possible reason could be that people with better awareness of the Islamic laws of inheritance have tendency to over-value the rights of men against the rights of women because according to Islam women do not have equal status in inheriting property. The results, however, also suggest that the respondents who claim to have obtained information regarding women's economic rights directly from formal religious sources and/or have acquired formal religious education are relatively more likely to give their daughters their rightful shares in inheritance and form positive attitudes towards women's rights to inheritance and ownership of property.

An obvious implication of the results is that the attitudes towards women can be significantly improved through education. This not only includes formal education of individuals through schooling but also the general education of society through electronic and print media. Although various TV channels present programmes on Islamic teachings but most of them are concerned with technical aspects of Islamic practices, while those focusing on women's rights are rare.

Furthermore, the contents of education also need to be revised to educate the society about the rights of women as prescribed by law and religion. There is also a need to reform religious education system. The syllabi of Islamic studies should also include references to such Islamic teachings that clearly state the importance of women's rights. For example, translation and elaboration of the sections of Sura Nisa (a chapter in Holy Quran) that gives a very detailed guideline about the distribution of inheritance wealth can be made part of the syllabi at least at the high school level, if not earlier.

There is also a need to educate the society about the negative side of certain marriage practices prevalent in society such as exchange marriage and marriage with relative, especially with cousins. In this respect also the syllabi of the formal education system need to be revised and various sources of media may be encouraged to come forward and play their roles.

APPENDIX A

Table A5

Results of Probit Regression Models

	Dependent Variable			
Independent Variables	Intention_ Share	Opinion_ Share	Opinion_ Name	Opinion_ Manage
Intercept	–1.390	0.442	1.051	–1.969
	(–1.76**)	(1.30)	(2.58*)	(–3.40*)
Income	–0.028	0.026		0.0298
	(–1.62	(2.45*)		(2.16*)
Assets	0.473		0.095	
	(3.39*)		(1.13)	
N		–0.080	–0.084	
		(–2.51*)	(–2.62*	
N_Sons				0.075
				(1.00)
N_Daughters	–0.185			
	(–1.77**)			
Birth_registration	0.013	–0.006	–0.005	
	(2.86*)	(–2.61*)	(–2.22*)	
Age	–0.049		–0.009	–0.015
	(–3.30*)		(–1.49)	(–1.22)
Marriage_exchange			–0.416	
			(–2.05*)	
Marriage_cousin		–0.311	–0.529	–0.363
		(–2.42*)	(–3.26*)	(–1.56)
Marriage_relative			–0.326	
			(–2.04*)	
Edu_Primary	0.651	0.413		
	(1.46	(1.46)		
Edu_Middle	0.861	0.459	0.442	
	(2.59*)	(2.16*)	(2.22*)	
Edu_College	0.517	0.408	0.553	0.811
	(1.62)	(2.50*)	(3.31*)	(3.07*)
Edu_Higher	2.898		1.528	1.906
	(3.08*)		(2.90*)	(4.13*)
Edu_religious	2.039	1.199	1.672	0.441
	(2.08*)	(1.92**)	(2.96*)	(0.96)
Understanding_Quran	–1.091	–0.352	–0.828	
	(–1.32)	(–1.10)	(–2.21*)	
Aware_Islamic_law	0.401	–0.272	–0.263	
	(1.22)	(–1.70**)	(–1.68**)	
Aware_Country_law		0.402	0.248	0.406
		(1.93**)	(1.28)	(1.64)
Inf_religion	1.226	0.887	0.479	
	(3.10*)	(5.62*)	(3.03*)	
Inf_education	0.856	0.874	0.573	
	(1.47)	(2.71*)	(1.84**)	
Inf_media	0.904	0.768	0.788	0.582
	(1.22)	(2.37*)	(2.45*)	(1.30)
McFadden R-squared	0.321	0.190	0.149	0.331
LR statistic	83.9*	128.4*	104.3*	82.6*

Note: The results show estimated regression coefficients and t-statistics. The statistics significant at 5 percent and 10 percent levels are marked by * and ** respectively.

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The Gender Differences in School Enrolment and Returns to Education in Pakistan

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Using estimates of schooling demand function and private rate of return to education by gender derived from Household Integrated Economic Survey 2010-11, this paper attempts to examine if there is any dynamics to define a differential behaviour across gender in enrolment in Pakistan and if there is then what can be the possible cause of such discrepancies and how can they be reduced. The first set of analysis focuses on the estimates of probability of enrolment at primary, secondary and tertiary level of education by gender. Strong evidence for higher likelihood of enrolment emerges only at the secondary level of education when the gender is male. The behaviour of the determinants for these schooling demand functions at different levels of education differs by gender. One such key variable is parental education, which is more pronounced in case of mother's education towards increasing the likelihood of enrolment of girls at the primary and secondary level and of father's education for boys at all levels and girls at the tertiary level. Hence investing in female education today will not only empower females today but as a positive externality will also lead to gender equity in educational outcomes in the future. Besides this intergenerational externality of investment in female education, the finding establishes that when conditional cash programmes are targeted at mothers as a policy tool they become an effective measure in increasing current female enrolment. Moreover the case for reducing gender disparities in educational outcomes is further supported when we see how gender imbalance in educational attainment and female labour force participation lead to discrepancies in the private rate of return to education by gender. The varied estimates of private rate of returns to education for males and females show that such deviations arise because the females labour force on average is much less educated than males and hence if the object is to raise the rates of returns, a targeted policy for reducing gender differences in enrolment at all levels of education primary, secondary and tertiary will have to be implemented.

1. INTRODUCTION

Differential treatment of male and female child has been a widely studied phenomenon in context of South Asia. The distorted ratio of male and female mortality rate than the expected biological ratio in this region, gives an indication of strong son preference [Dr`eze and Sen (1989)]. In Pakistani society, women's autonomy is severely limited in the traditional setup because of cultural taboos and socially prescribed role of a woman as a housekeeper with very little access to economic opportunities as opposed to males. This is reflected in Pakistan's low ranking in the over all Gender Gap Index at

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134th place among 135 countries with respective low rankings of 134, 129 and 123 in sub-categories of economic participation and opportunity, educational attainment and health and survival [The Global Gender Gap Report (2012), page 285]. Such gender imbalances are alarming and need due attention in both theoretical and policy relevant empirical research.

There is no realisation about the importance of investment in human capital formation through formal educational training which becomes an effective tool to enhance the capabilities and skills of the work force and define not only the economic outcomes for the individuals themselves but also significantly impact the society's level of economic progress and development [Becker (1975)]. Further the global development trends over the last several decades confirm that in economies where governments effectively invest in education as a policy priority have performed much better both in terms of economic growth and its sustainability. But a more interesting query from the perspective of the current study is how gender equity in human capital building process through educational achievements may have played its vital role in such a process of growth. Such a role may indeed exist as the regions that have prospered both economically and socially, such as East Asia and Southeast Asia, have indeed shown by closing their gender gaps and enhancing the contribution of females in the growth process through increased labour force participation [gender gap report, page17]. While the regions that have lagged behind in terms of economic growth have also been left behind in terms of social equity across gender by limiting their investments in female education compared to male and hence restricting the women's contributions to economic and social progress [Gender Gap Report, page 20]. Hence equitable access to education by gender is important not only from social but also from economic point of view. In this dimension a female child in Pakistani society does not fare too well. The marginalised role of females compared to male in terms of access to education can be seen through figures of 57 percent, 82 percent and 76 percent for adult literacy rate of females as a percentage of males (2007-2011), gross enrolment ratio at primary and secondary level of female population as a percentage of males (2008-2011) as reported by UNICEF respectively which reflects large inequalities in literacy and school attendance across gender in Pakistan.

The prevalence of such huge gender gaps in educational outcomes in Pakistan has led to a contrasting debate that the inadequate demand for female schooling is either because of inadequate supply of schools for females by the government or is the demand side factors that are solely responsible for the inequitable educational outcomes for the female [Sabot and Burney (2002); Irfan (1991)]. The truth usually lies in the middle. Neither the supply side constraints can totally be ruled out nor the role of household decision-making in determining the level of educational attainment for a female child can be ignored altogether. In fact the supply side factors such as availability of an all female school and a close-by school may affect the demand for schooling for the daughters by ensuring their safety, in a household. Among the initiatives that have been taken by government of Pakistan to ease the supply side constraints include doubling of the number of boys and girls primary schools from 1988 to 1998. Yet the proportion of girls to boys enrolled in primary schools remained the same from which one may conclude there may be a weak demand for

female education at primary level in Pakistan [Mahmood (1997)]. On the contrary, there is a strong likelihood of a possible shift from public to private schooling system[1] for both sexes in search of better quality[2] since there is mounting empirical evidence in support of increase in supply of private schools in Pakistan, primarily co-education schools with few exceptions of single sex schools even in rural sector [Sathar, Lloyd, and Haque (2000), Arif and Saqib (2003), Tahir, Das, and Khwaja (2010)]. Therefore the decision making at household level about the educational investments in to their children is critical for understanding the overall picture and much more research needs to be done to analyse empirically from both social and policy perspectives that whether demand for schooling vary by gender and if so then what are the factors that lead to such imbalances in Pakistan.

Further how one should invest is indeed guided by return to such an investment. Such a focus on return is true both for a policy maker given the budgetary constraints facing them and also for households, which besides facing resource constraints also have to give due weight to time constraints for their child so as to use their time wisely and effectively. Hence the second focus of the paper is to estimate private returns to education by gender so as to understand the decision of the household for under-investing in a daughter's education in face of such estimates of private rate of return of education for both males and females. Further by noting the positive externalities that may result from female education and through discrepancies that exist in male and female returns to education, a case is built for greater and specific policy focus on female education as a priority. This question is even more relevant in the context of Millennium Development Goals where among the goal of achieving gender equality and empowerment it was agreed as a target to eliminate gender disparity at primary and secondary education preferably by 2005 and in all levels of education by no later than 2015. Hence keeping the above consideration in mind, an attempt has been made in this study using estimates of schooling demand function and private rate of returns to education by gender for Pakistan derived from Household Integrated Economic Survey 2010-11 to understand if there is any dynamics that will define a differential behaviour across gender in enrolment and if so then what can be the possible cause of such discrepancies and how can they be reduced.

The lay out of the paper is as follows. The following section presents literature review as why there may exist under-investment in a daughter's education compared to a son in parental resource allocations in context of developing countries. A brief review of key determinants of school enrolment at household level is discussed in Section 3. In

[1]However how private and public schooling is playing their role in gender dynamics in schooling through assessment of quality difference across such type of school system and their subsequent impact on cognitive and learning skills of the students and also the accessibility and affordability of different types of schools to household by gender is beyond the scope of this study due to limited information in this regard in given data set and this question will not be assessed in the study at hand.

[2]Tahir, Das and Khwaja (2010) provide evidence in favour of private schools outperforming government schools even when located in the same village and accounting for differences in household socioeconomic characteristics. Similarly empirical evidence in Arif and Saqib (2003) also support the plausible shift in parental choice towards private sector education for their children in search of much higher quality whereby students of private schools were found to be performing significantly higher than public schools in learning achievement tests across considered six district of Pakistan and in Azad Kashmir, however there were discrepancies in how well private sector performed in education across these districts.

Section 4 and 5 we present the model and estimation technique. Descriptive analysis of gender difference in school enrolment and earnings is given in Section 6. The estimated results and findings are presented in Section 7. The final section concludes the paper.

2. LITERATURE REVIEW

The scope of the current study tries to understand the gender disparity that may exist in enrolment patterns and the returns to education and further tries to develop both conceptual and empirical link in these two distinct economic processes.[3] Hence keeping in view the above objective we divide the review of literature in the following four sub-sections:

2.1. Gender Disparities in Educational Outcomes

Differential treatment across gender can occur in different shapes and sizes in a society. It can be of apparent nature in form of smaller household expenditure on a girl child's nutrition, health and education in comparison to her male siblings to more hidden forms where a girl raised with equality may realise how unequal she is when she steps out of the house to work or when she gets married and is not given freedom to work or take her own decisions, a female may face varying degrees of discrimination depending on her circumstances in a patriarchal mind set. Why has parental resource allocation been observed to be empirically skewed towards a son across a range of countries is explained in theoretical literature by conceptualising children to be either "investment goods" or "consumption goods". When children are modelled as investment goods then parents as rational neoclassical utility maximisers allocate more resources to children who yield better return [Becker (1975); Becker and Tomes (1976)]. While models in which parents directly get differential utility from their children consider them as 'consumption goods' and the societal constraints may skew parent's utility function towards a particular child in our context towards a particular gender of an offspring [Lakshmanasamy (1991)].

From the investment point of view, the relative return on a son's education in terms of how much the expected earning of the child could be spent on parent's welfare in future may be compared to a daughter's in developing countries. One possible reason for the above conjecture is that reliance on a son's earning in old age may serve as a credible post retirement insurance mechanism for parents especially in absence of any other institutionalised safety net measure in case of developing economies. This dependence of parents on their sons in old age becomes even more important in the traditional setup where dependence on daughters is considered to be demeaning for parents. In such societies a daughter after marriage is responsible only for her duties towards her in-laws and if she choses to remain single for some reason it is also considered as a sign of dishonour for the family culturally. Another reason why it is better to invest in a son than a daughter is because of much higher future earning

[3]It is important to note that the current enrolment patterns and the returns to education for a given society are calculated at a point in time using two non-overlapping samples since the first phenomenon of current enrolment deals with groups of children who are of school going age and whether they are currently enrolled or not in school while the second phenomenon deals with groups of individual that are out of school and are of age to take part in labour market for wages and their completed level of schooling. Though these groups may not be the same yet they do give insight as to how much society and individuals value investment into human capital building through education.

potential for a male than female in such societies. This is due to much better performance of males to perform certain tasks due to their greater physical strength (especially in agricultural sector), presence of labour market discrimination in form of higher wages to males than females for identical work or through occupational segregation as a result of men's preferences to keep distance from their female colleagues whose mere presence in an all-male dominated profession is cause of discomfort to them, lack of employment opportunities for females that fit their social preferences and finally due to cultural constraints on female labour force participation by prevalence of purdah practices (female seclusion) and rigidity of gender roles confining women to their housekeeping responsibilities [Deolalikar (1993); Das and Desai (2003); Goldin (2003)]. The cultural element may indeed act as a determining factor for female labour force participation especially in traditional developing economies by defining both their status in the society and also their mobility in and out of labour market and into non-wage (such as self-employed) and unpaid work [Desai and Jain (1994); Ghosh (1996)]. The evidence that parental resource allocation can change in favour of children who are expected to earn more in future has been documented in Rosenzweig and Schultz (1982) using rural household level data and district level data in India where it is empirically shown that female children receive a proportionately larger share of household allocations as compared to males when women's expected employment in the labour market is high.

Further the socioeconomic background of the parents may very well shape the preference for more or less education of their children and towards a specific gender. Increase in wealth of parents at one level may act as liberating force for them from the binding resource constraints that may hamper child prospects for education in face of poverty and at the other may make children's education valuable as a consumption good for parents in case they have acquired the high class status for both the sake of equipping their children with marketable skills for their bright future and also by becoming more of a class norm to which parents belong, which may lead to over-investment in their child's education. More importantly, parental socioeconomic worth provides a financial base to access the credit market at much lower interest rates while poorer households have little access to formal banking system due to infeasibility of loan recovery mechanism in the absence of collateral for such resource-poor households [Becker (1967); Jacoby (1994); NaRanong (1998)]. The other element that guides parental decision to invest in their child's education, especially in face of resource constraints, is their attitude to risk. Whereby the higher is the parents' risk aversion, the lower is the probability of the children's enrolling in higher studies with possibility of actualisation of returns after a long time lag. The risk element may enter into a parent's consideration with higher and low socioeconomic status in varied ways. In this regard, the important decision for wealthier parents is to ensure the intergenerational class maintenance for their children and for which they may opt to over-invest in their children's academic career and higher education [Breen and Goldthorpe (1997)]. On the other hand, parents belonging to poor income groups, facing much stricter liquidity constraints with less financial strength to bear costs of expensive higher education, try to insure themselves by training their children with marketable skills that will materialise into paid employment with shorter time lag [Tieben (2011)]. With regard to how such behaviour will translate into preferences of parents for educating their son against their daughter will depend on how

the society values the son against the daughter at high and low ends of parental wealth distribution. The class consciousness and fear of intergenerational loss of class may apply to daughters as much to son at the higher ladder of social status, however, in a patriarchal setup investment in the daughter's education in high income class may not be done with the objective of increasing their induction into the labour market later on but more so for their class maintenance through marriage [Das and Desai (2003)].

Further for those households facing extreme poverty, the question is not just whether to send the child to school or not, the question is how to make mere survival of the child and household itself possible. Here in case of binding resource constraints with high level of poverty, the trade-off between child schooling and child work in paid employment for parents comes to full force that has consequent impact on the child's future [Basu and Von (1998); Ahmed (1999); Basu and Tzannatos (2003)]. Such budget requirements may be stricter for a poor household, given the limited or non-existent opportunities for borrowing in the face of a temporary crisis forcing children into paid employment [Baland and Robinson (2000)]. Further as such financial shocks have regular occurrence in poor households, the dependence on child earning that was initiated by altruistic parents for a short period, may turn into long-term arrangement given the survival of child itself being dependent on such earning in case of extreme poverty [Basu and Von (1998); Basu and Tzannatos (2003)]. Given that merely dropping off from school or deciding on child work for paid employment against schooling is more meaningful at the lower end of income distribution both as a risk coping strategy in face of stringent credit constraints, how will the child's gender matter will largely be an empirical question. This is so because a household may at one level opt against girl child schooling given higher future returns of a son's education for parents than a daughter in traditional economies. But at the same level patriarchal restrictions of purdah, family's honour consideration and safety concerns tied to females of the household that limit their schooling prospects may also constrain their participation in labour force confining them to household responsibilities. Further, when a girl child is forced to come out to work, she may face much more stringent market demand than a boy being mainly restricted to low-paid household jobs. Hence how gender dynamics may play out in the final math of the child's schooling and employment nexus and who among male and female child is more prone to take part in formal market work is also largely an empirical question.

Finally, the direct and indirect cost of sending a daughter to school may be more than a son's which will have its due impact on a female and male child schooling prospects. This could be due to involvement of a girl child in housework and in babysitting activities of her younger siblings. However, the presence of elder siblings and elder women may ease this constraint. Also the safety concerns for female child may be more than a boy that may affect their education adversely. Moreover in traditional societies, the marriage of a female is associated with dowry payment, especially where practice of hypergamy exists, to raise their daughter's marital position, whereas their inability to arrange proper marital linkages often imply loss of honour for the natal family and added social pressure [Caldwell and Caldwell (2005)]. In such societies the inherent preference for having a son than a daughter for investment in education will not only imply relative higher returns in terms of higher potential earnings but also the possibility of receiving higher dowry and having lower marriage costs in comparison to a daughter for whom parents need to save to pay up for the dowry at the time of her marriage which

leads to under-investment in her educational activities [Lahiri and Self (2004)]. Hence there can be a desire for sons over daughters shaped by cultural and social norms [Das Gupta (1987)].

2.2. Conceptual Link between Educational Achievements Pattern and Private Wage Returns to Education by Gender

Given that there is no concrete evidence that biologically males and females are endowed with differed abilities and capabilities,[4] differential private returns to education should not theoretically be present across gender and marginal increase in earnings for an additional year of education should be the same for both males and females. However if higher private returns accrue to any one gender, one needs to be careful both in its interpretation and also in its implication. First of all, one needs to understand the concept of returns to education and why such returns should be calculated separately by gender. That is, are there any structural differences (not in biological or genetic differences sense) across male and female population that may produce different rate of private return for them and if so how much of such a process can be attributed to differences in labour market dynamics through discrimination by gender and how much due to the varied characteristics of two groups of wage earners. In this context the perspective of cultural and socioeconomic forces has to be taken into account that may be responsible for creating such discrepancies and may differ according to different conditions that for example prevail in developing and developed countries. Keeping the above considerations in mind, we will first analyse the conceptually circumstances under which private rate of returns can vary by gender and then how the problems in estimating the rate of returns may impact differently across male and female population leading to varied estimates for the two groups.

2.2.1. *Conceptual Background for Differential Private Rate of Return to Schooling by Gender*

The starting point of assessing the value of investment into an additional year of education involves the analytical framework developed by Mincer (1974), according to which the private rate of return to an additional year of schooling is affected by comparing the present costs of education—as current wages forgone—with the present discount value of future income streams, if the opportunity cost of the time spent on that extra year of schooling approximates to the private family cost of going to school. Empirically such an estimate of private rate of return is estimated by regressing the log wage on years of schooling, whereby the estimated coefficient on schooling indicates the percentage change in wages received for attending an additional year of school. How to invest in education by gender will be decided ultimately through weighing the associated costs and benefits of such an investment that may differ by gender. For example in terms of costs, the time cost may be more relevant for females who have greater household responsibilities doing household chores or caring younger siblings while for the male the forgone wages may be much more especially in traditional societies. Further, wage

[4]The work of Canadian psychologist Doreen Kimura strongly supports the idea that there are subtle biology-related differences in the cognitive abilities of males and females, with these becoming significant at the high end of ability scales.

benefits of education may also differ for male and female as a result of statistical or structural gender discrimination in the labour market.[5] Hence given the heterogeneity in stakes by gender in relation to their education, there will be differential rate of private return to education for male and female population.

Further, the way the discount rates are determined in relation to size of educated group across male and female populations may also explain why the rates of return differ by gender. This is more relevant in case of developing countries where the level of education attained by females is much lower than that of the males at each level of education. In such a pool of comparatively less educated female workers relative to males, the marginal returns tend to be higher for females than males given that returns decline with more education [King and Hill (1993); Schultz (1988, 1995)]. Also females having higher time costs for continuing education compared to benefits of joining the labour market might end up achieving lower level of education and hence will have higher discount rates. This would mean whatever differences may arise in returns to education by gender will be in consequence of the size of the pool of that educated group across gender. Hence though the gap between men's and women's years of completed schooling is vague it is an informative measure that indicates not only the disparity in educational outcome by gender but also tells us why returns to education may differ by gender. Moreover higher returns for females are based on the larger "slope" coefficient for girls' schooling than of the males while constant terms in the earning function by gender may reveal that on average females get lower wages than men which may be due to varied labour market conditions faced by males and females. Or, in other words, even when private internal rates of return to schooling are higher for women than for men, there is a possibility that the overall level of wages would tend to be lower for women than men. However, the focus of the current study is not the gender wage gap and how much of it can be attributed to discrimination, whether statistical or otherwise, but the crucial point—that we need to keep in mind—that while comparing the rate of return by gender for explaining differential investment in education by gender, the correct interpretation is that that on average males earn more than females, but among females those who are educated enjoy higher returns than females who are not educated as compared to how much more educated males earn compared to less-educated males.

Hence a labour side explanation for the differential pattern of schooling across gender through estimate of private rate of return should be approached with caution because, firstly, how would households respond to such returns in choosing educational investments for their child is not necessarily based on the private return that the individual will get but rather on the expected return to household and parents in future and also on how such expected return from education will compare with the rate of return on alternative investments for the parents and household on the whole. In this regard benefits of male and female education may be weighed differently by household especially in traditional patriarchal society where a son is responsible for parent support and daughters for looking after in-laws. Moreover the labour market conditions as earlier

[5]Statistical discrimination is an economic theory of racial or gender inequality based on stereotypes. According to this theory, inequality may exist and persist between demographic groups even when economic agents (consumers, workers, employers, etc.) are rational and non-prejudiced. This type of preferential treatment is labelled "statistical" because stereotypes may be based on the discriminated group's average behaviour.

mentioned may differ for males and females and also the opportunity cost for time devoted to education may also vary by gender especially if females are expected to contribute in household chores. Hence trying to link differential private rate of return by gender without giving due weight to other social and economic linkages can give a misleading conclusion that higher private rate of return to schooling for males on average makes economic sense for households to invest more in education of the male child, but if females show less attendance males along with higher relative rate of private return to female education, then this would amount to serious misallocation of resources in a household.

2.2.2. *Empirical Ambiguities in Private Rate of Return to Education Estimation by Gender*

Two different models for males and females need to be estimated separately because of structural differences in the two populations to avoid the ambiguities that may arise due to lower female labour force participation, especially in case of poor developing countries, and finding credible adjustments for labour productivity for females who stay out of the wage labour force. Besides the problem of credible adjustments to solve such sample selection bias, low participation rates in wage employment for females and dropping out of females from paid work due to household or child rearing activities means that post-schooling experience proxy for females has much more measurement error and is calculated with much less precision as compared to men resulting in a downward bias to its coefficient. Further, infrequent attachment of female population to paid employment not only leads to proportionately smaller increase in productivity of females in the wage labour force but also affect the kind of female pool that chooses to enter the labour market. This is so if culturally or due to household responsibilities females tend to stay out of labour force in much higher numbers than men then among those females who chose to work this very fact may show their higher level of motivation and capability. Hence the social and cultural constraints that restrict female paid work also acts as a filtering out mechanism, whereby among those females who choose to participate may on average be more capable compared to men who have a much higher mix of less and more able workers. Given that there are structural differences in labour force participation pattern across gender, not only does this call for separate estimation of the Mincerian earning function for the two groups but also the resulting differences in parameters estimates should not be directly inferred as evidence of labour market discrimination but should be placed in the context of difference in cultural and social norms for the two populations [Birdsall and Sabot (1993)].

Hence the foremost concern for estimating unbiased and consistent estimates of returns to education for females is to deal with the problem of having data on only labour productivity for females who work and not having such information for the large pool of women who opt out of wage employment. The pioneer work in finding correction for such sample selection was done by Heckman (1980) in which through identifying the variables that impact the women's decision to work or not, such as those incentives that are presented to her to come out to work due to prevailing market wage opportunities facing her, her husband's financial support system and finally her non-labour assets such as dowry or inheritances, one can correct for such sample selection under the assumption

of exogeneity of such variables. However, among the first two identifying channels such as her own market wage that creates incentive for her indulgence in paid work or the husband's income cannot be used as independent determinants of her likelihood of work since the decision regarding her marriage match-making, fertility and time allocation between household focus and paid work are simultaneously determined and are not strictly independent of her labour supply. The most credible identifying variables in predicting probability of work in a wage job for a female in this regard is then the woman's source of non-earned income given that such claims have no link in determining her expected wage rate and the greater her non-earned income assets, the more likely is that she will choose not to work [Schultz (1995)].

2.3. Social and Economic Rationale for Decreasing Gender Disparities in Educational Outcomes

Sustainable development requires balancing the growth objectives of an economy with both its social impact and intergenerational impact. In this context, reducing gender gap in education by investing more in female education as a policy priority has positive consequences both socially and economically. Let us highlight few such channels through which these impacts can be materialised as below:

2.3.1. *Social Externalities in Face of Gender Equity in Education and Policy Perspective*

Education entails externality for both males and females; however, with the issue at hand, let us plead the case for gender equity from a social point of view by highlighting a few plausible social benefits that may result in the long run from enhancing female education. This is so because education not only equips an individual with human capital for cashing one's skill in the labour market but also generates enormous social externalities that though hard to quantify are of paramount significance in informing and guiding social policy. Any discussion of private rate of return to education and its link to educational achievements and outcomes for the society without giving due attention to such differential externalities from education by gender could mislead policy direction. The most important social benefit from gender equalisation in educational attainments is the intergenerational mechanism through which policy focus on female education today will yield a smaller but much higher quality pool of children tomorrow when these investments materialize in a decade or so. These insights result from building empirical evidence on the impact of mother's education as compared to the father's schooling on children's health and educational outcomes in terms of weight of the child at birth, infant mortality estimates, more balanced nutrition, entry into school system, school enrolment patterns and completed years of schooling at adulthood [Schultz (2001); Strauss and Beegle (1996); Thomas (1990, 1994); Quisumbing (1995); Haddad, *et al.* (1997); Schultz (1998); Alderman and King (1998)]. Moreover the fertility behaviour of females is closely linked to the education of mothers and increasing female education has been found to be an effective tool to curtail the population growth rate while the father's level of attained education has been found to be less associated with controlling population pressure which in fact has been documented to cause increase in fertility in low income countries keeping women's schooling constant, though this trend subsides with

development [Schultz (1973, 2001); Cochrane (1979)]. However the question that arises here is to find how these externalities manifest themselves at different levels of female education—primary, secondary and tertiary—to see which level policy should target Such a differential impact of primary and post primary mother's education on a child's educational outcomes has been found in case of rural India [Behrman, *et al*. (1997)].

2.3.2. *Economic Incentive for Gender Equity in Education and Policy Perspective (Public Finance And Implications For Taxation)*

Broadening the tax base is extremely important for proper functioning of governments especially in developing countries where tax to GDP ratio is low. The tax rate policy should focus on the means to bring more and more workforce in the tax loop while trying to minimise distortions and efficiency loss on account of the tax disincentive and the effect it will have on time management of individuals between their different roles defining the composition of their consumption and investment bundles. In this context, reducing gender disparities in education by increasing female education will at one level may result in increasing the pool of tax paying workers resulting from a bigger female labour force historically and globally [Schultz (1981)]. Hence the possibility of increasing the share of adult time allocated to marketable work through increased female participation in paid work with increase in female education not only results in increase in overall taxable income and hence tax base but also provides policy scope to decrease the overall tax rate when the tax base has grown sizably. Further to curtail efficiency loss, greater elasticity of female labour force supply than of males may also provide leverage for differential tax policy by gender, tax being lower for females and higher for males [Boskin and Sheshinsky (1983); Apps and Rees (1988); Schultz (1981, 2001); Killingsworth (1983)]. However this impact of increased female education on economic efficiency through tax mechanism is more applicable to developed economies where tax coverage is relatively higher and not in case of developing economies such as Pakistan where there is no strong association between female labour force participation and education and where public finance deficits are high and tax to GDP ratio low.

3. THE HOUSEHOLD LEVEL DETERMINANT OF SCHOOLING AND THE POLICY PERSPECTIVE

Considerations that decide the level of schooling for each individual are not straightforward. There are many inter-linkages. The most important consideration in household decision making is the role of parents in choosing to invest in the child's future through educational or health investment or among the extremely poor deciding to pull the child out of school and send him or her for paid work.

In this perspective the most difficult question concerning household dynamics is the father's and mother's role whether they decide jointly for their children's future or the preference of any one the parent has a defining role in these decisions. Theoretically, these insights lead us to two approaches for modelling household behaviour. The first strand of literature treats the household as a unit where an altruistic head (parent) maximises the joint welfare of the household through a unified preference function subject to resource constraint [Becker (1981)]. The second approach analyses the outcomes of intra-household resource redistribution in terms of the bargaining power of

the members of the household and how varied preferences of the two parents have consequential impact on the children's outcomes [McEleoy and Horney (1981)]. Among factors that determine the degree of bargaining power of an individual include the wage earned in market, received inheritance and assets and how society defines their gender roles. Irrespective of whether the household maximisation problem uses a unified preference function in line with unitary household models or two separate preference functions for the two parents as done in bargaining framework, the internal household decision regarding schooling attainment of children is modelled in terms of the defined preference keeping in view the budget constraints and educational production functions that relate the educational outcomes of children through schooling to the child, mother and father time inputs. The time consideration for both child and parent has a defining role in structuring the family demands in such household models that directly affects the opportunity cost of many consumption commodities and investment activities for the household [Becker (1981)]. Here the parental background in terms of their education and other community indicators such as proximity of educational facility, rural or urban living, play an important part. Such an intra-household allocation mechanism results into a system of reduced form demand equations characterising the child's schooling being negatively related to indicators such as schooling cost and positively to household non-labour income and parental education.

In the above framework of intra-household decision making, the choice regarding educational investment is explained by weighing the expected returns to education of a child against the opportunity cost of child's time spent in studying and the forgone income of the household on education of the child. This literature introduced a quantity and quality trade-off for children implying that increase in the number of children in the household leads to compromise in the quality of education given to them and vice versa and hence, in this perspective, less investment in a female child's education may be considered a rational choice on part of a household as economic returns to the household for educating a male child are more than a female child. From the parents' point of view their return on investment in a child will depend on his ability to support them in old age. The expected returns of a female child will be low because of the limited opportunities in labour market for them compared to males and also their marriage in to a new family will limit their ability to support their parents later on. Further expected returns to education of a child whether male or female depends not only on his/her innate ability and the education attainment but also on their parental background since well-placed and well-educated parents may not only have the means to give their children better educational opportunities but also will have the means to place their children in high wage jobs due to their background and connections. Hence, how the father's and mother's education impact the schooling outcome of their children especially by gender may be an important element in the decision-making and may give us a clearer perspective on the intergenerational impact for policy initiative to reduce gender gap in education.

However, before we go into the above nexus of parental education and probability of enrolment of a child, let us first discuss the empirical ambiguities in finding the correct magnitude of impact of the mother's and father's education on the probability of being enrolled for a child. Inclusion of any factor that is determined by parental education may dilute the impact of parents' schooling on the likelihood of the child's school enrolment.

For example independence of mother or father's wage income or family wage as a control is questionable since education of an individual itself may be a determinant of the income they will earn. Moreover family or mother and father's income are determined as joint preference of two spouses to share work and household responsibilities among themselves which decides how they choose to manage time allocation in respect of these two roles between themselves [Becker (1981)]. Put more precisely does the preference of parents lead to specialisation in their respective role as one spouse being the prime bread earner and the other being delegated the role of housekeeping or, do both spouses work, and if so, how do they allocate time between their work and child rearing responsibilities; these dynamics need to be assessed carefully. Moreover, the preference formation in this framework itself is important [Becker (1981); Schultz (1981)]. For example are the two parents working with each other towards a cooperative equilibrium or do they work in conflictual environment which further calls for deeper research with the need to capture the impact of those variables that define the bargaining power of each parent over the other. Further, the non-labour income indicators may very well be accumulated as a result of their wage earning capacities, hence care needs to be done to find such proxy of wealth that may not be linked with wage income of individuals in any way, otherwise it will falsely capture some impact of parental schooling. Finally, considering that the mother spent more time in child care than most fathers do, especially in traditional patriarchal societies, household behaviour may indeed show much more pronounced role for the mother's education on children's outcome including their schooling prospects, as has been supported in mounting empirical evidence globally [Thomas (1994); Alderman and King (1998)]. However this may be a good indication for policy initiative for spending much more on female education and decreasing the discrepancies across gender, especially in the education sector, so as to create positive intergenerational externality from that investment. However, this should not be mistaken as evidence of greater preference of mother for education of children than the fathers' or evidence in favour of a bargaining model against a unified model. For such a conclusion, deeper research needs to be done to see how marriage making takes place within the society. For example if an educated husband chooses an educated wives for the sole purpose of improving their children's future with greater educational focus both from his and the mother's side for the child, then it could be that the proactive role of mother's schooling on children's educational prospects may indeed be capturing the preference of the husband [Foster (1996); Behrman, *et al*. (1997)]. Hence in such cases a sizable estimate of mother's education on the probability of enrolment for a child compared to father's schooling rather than being indicative of mother's inclination towards children's education is also reflective of the influence of the marriage making process in which the husband's preferences show their impact especially if there is evidence of positive assortative marriage match in data where educated husbands are choosing educated wives for raising better quality of children.

4. MODEL FOR SCHOOL ENROLMENT

Applying the insight from Section 2, a full simultaneous model of household decision making over the lifecycle is needed for properly studying the phenomenon in respect of schooling attainment of children. Obviously such a framework should ideally

include determinants of fertility behaviour of females and hence determinants of family size, determinants of family composition through marriage or divorce for single parent who may behave differently than a married parent and how such a household composition relates to a support system through joint setup (generally relevant to traditional societies like South Asia) and co-residential arrangements of partners without formal marriage (as seen in developed western societies), some indicator of relative bargaining strength of parents, especially a mother's and finally, an indicator capturing the preference of husband through marriage making process and how that influences the mother's behaviour. However all these factors at one level will be affected by many of the same factor as schooling of the children and on the other will themselves impact determination of other variables in turn. This is a valid concern since, firstly, within the generic framework of household decision making both time allocation of children to schooling and other wage activities and parents' wages are jointly determined in the system. Secondly, many of these behaviours like fertility, marriage-matching and household compositional element and bargaining strength of spouses are themselves determined by how spouses allocate time between home activities and outside paid work. Finally, the question of investing in children both time and expenditure wise will ultimately be guided by the above objectives and preferences as to how many children to have within or outside the institution of marriage and what strength each parent have in such decisions.

Hence a comprehensive study of household behaviour is very complex. The scope of the current study does not allow the coverage of all the possible inter-linkages. Here the range of research will depend on the availability of factors in the data set. In this regard we do not aim to test for unitary versus bargaining models and neither do we take into account the marriage-matching process and fertility behaviour of females. But given the data limitation we try to estimate the impact of the mother's and father's education controlling for household budgetary constraints through putting controls for household size and characteristics of the individual that cannot be influenced by the parental educational background in any way—such as being in joint family system against a nuclear setup—and the head's age as a proxy of patriarchal rigidity in the older generation so as to get much clearer estimate of parental education on the probability of enrolment. Hence we avoid using variables related to wage income or even proxy of non-labour income for we cannot identify clearly how the household acquired that wealth in our data set and therefore the possibility of such proxies being related to wage incomes of family members cannot be ruled out and such proxies cannot be considered as exogenous. Keeping the above consideration in mind, the following separate demand function for schooling has been estimated for individuals in age group 6-10, 11-18, and 19-30 using likelihood of enrolment behaviour. These age groups roughly correspond to age groups of individuals who may be enrolled in primary, secondary and tertiary levels of education. Here we have confined the tertiary age limit from 19 to 30 since in our data set the enrolment status after 30 is found is included only for observation and this pool is generally not seeking education. However within the 19-30 age bracket we find much more concentration of individuals who are involved in higher studies.

$$\Pr(S_i) = F(\alpha_{jk} + \alpha_{jk} A_i + \alpha_{jk} H_i + \alpha_{jk} C_i + \varepsilon_{ijk}) \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (4.1)$$

where

i = indexes the individual child
j = indexes the gender (m = males, f = females)
k = indexes age groups
$F(\ )$ = cumulative logistic distribution
$Pr(S_i)$ = the probability of child i being enrolled in school
A = vector of single age dummies
C = vector of community characteristics (urban and provincial dummies)
H = vector of household characteristics (parental years of schooling, joint system and head 's age).

In Equation (4.1) single year age dummies are included to control for any nonlinear relation between the child's retention in school and the child's age. Here we use the urban dummy as an indicator of cost of education and we expect its positive impact on the likelihood of enrolment since there should be easy access to education and availability of all sorts of schools including single sex school in urban centres compared to rural sector. We use level of urbanisation rather than using distance to school as proxy for price of education (availability of educational institution close-by to one's place of residence can lower the total cost of education and is expected to positively affect school enrolment) because in our data set we only have information for distance to school for children who go to school. This introduces perfect collinearity between the enrolment dummy and distance to school variable due to which we have not been able to use this information in our regression model. Here parental education serves two purposes: one, being a direct interest variable in terms of the differential impact of mother's and father's education on the likelihood of enrolment for a child by gender and further, as a proxy of parental socio-economic background. This is so since we cannot include proxies of wage income or non-wage income, given that such proxies will be highly influenced by education of the parents themselves. Finally the provincial variation in enrolment probabilities is controlled for in the above regression through applying provincial fixed effect.

Equation (4.1) is estimated by maximum likelihood logit estimation method. In this case if we estimate equation (1) by OLS then the discreteness of the dependent variable is ignored and OLS does not constrain the predicted probabilities to be between zero and one. In case of the logit model, the predicted probabilities are ensured that they will stay between 0 and 1 range. To see the impact of dependent variables on the likelihood of enrolment across males and females, we estimate each equation separately for males and females rather than using the interaction term of female dummy with all dependent variables. This has been done keeping in mind that the marginal effect of interaction term as calculated by standard software like Stata does not give us the magnitude of true interaction effect in case of non-linear models; also the sign and significance of true impact could be different than that calculated by Stata for interaction term [Ai and Norton (2003)].

5. MODEL FOR ESTIMATION OF RETURNS TO SCHOOLING

The extensive literature on returns to education that has come out has been built on Mincer's (1974) pioneer work. The basic idea behind Mincerian earning functions is that

individuals choose to invest in education as a human capital building tool by comparing future wage streams derived from education with current costs of being at school instead of the labour market under the assumption that only the cost of attending school is forgone wages, the tuition expenses notwithstanding. Further, the build up of additional human capital investment through post-school training is not accounted for in standard Mincerian specifications, Only enhancement in wage income other than the attained education of workers that is controlled for is accumulation of more human capital through increase in years of experience. Under the above assumption, the coefficient of years of schooling in an standard Mincerian earning function measures marginal increase in wages for an additional year of schooling or schooling spline and provides an estimate of private rate of return to time spent in school instead of labour force as below:

$$\log(W_i) = \alpha_{ij} + \beta_{ij} Sch_i + \varphi_{ij} Exp_i + \delta_{ij} Exp_i^2 + \varepsilon_{ij} \quad \ldots \quad \ldots \quad \ldots \quad (5.1)$$

$$\log(W_i) = \alpha_{ij} + \sum_k \beta_{ijk} S_{ik} + \varphi_{ij} Exp_i + \delta_{ij} Exp_i^2 + \varepsilon_{ij} \quad \ldots \quad \ldots \quad \ldots \quad (5.2)$$

where

i = indexes the individual
j = indexes the gender (m = males, f = females)
k = indexes three level of schooling (prim = primary, sec = secondary, tert = tertiary)
$log(W_i)$ = Log Daily Wage Rate for Individual i
Sch_i = Years of Schooling for Individual i
Age_i = Age of Individual i
S_{ik} = 1 if completed educational level belong to k level of schooling, 0 otherwise

In the above model we use age as proxy for experience rather than using potential experience (Age—years of schooling—school starting age). This has been done keeping in view the endogeneity of potential experience as a proxy of experience, since the wages one person gets or may get may also define his or her acquired schooling level at one level and, at the other, the difficulty in extracting private rate of return using potential experience as a proxy keeping in view that here the analysis is not being done just for yearly increase in schooling level but also splines of education level as primary, secondary and tertiary. However, the use of age as proxy of experience will slightly overestimate the private rate of return than where potential experience is used instead, which needs to be acknowledged here. Provincial rural and urban variations are controlled by introducing dummies for provinces and urban.

Further it is impossible to find a totally unbiased and consistent measure of rate of return both theoretically and from empirical point of view [Kling (1999) and Card (1999)]. Theoretically, given that marginal returns and cost will vary for each individual, ideally one would like to get a separate estimate of private rate of return that should vary across individual and also for different levels of education for each individual. Both such estimates are impossible to retrieve empirically given data limitations. Moreover, a biased estimate may result due to inability to account for other variables that are of consequence and importance in wage determination beside education or that may impact both education level and wages such as unobserved ability and socioeconomic and family

background. Hence the estimate of rate of return to schooling in Equation 5.1 and Equation 5.2 can be biased upward because it may be capturing the impact of omitted variables like quality of education, ability and motivation of the individual etc. Ability and motivation across individuals results in variability in the marginal costs and returns faced since the more able the person is the higher is the possibility of pursuing education by resulting decrease in associated costs and increase in plausible future wage benefits; while individuals with less ability will be filtered out from education system much sooner to earn wages. Similarly family background such as the parent's education and socioeconomic status can define the costs and benefits faced. For example, wealthier families may be more inclined towards education of their children to secure their children's status in future and may use their wealth more freely for this purpose. To remove the impact of unobserved household and community characteristics that are shared by the family members and also account for parental income or education structure, we apply household fixed effect by keeping the data on siblings (for males we keep families with two or more brothers; similarly for females we keep families with two or more sisters) and take deviation from sibling means. However, these estimates may show that OLS estimates are biased upward but are not very credible due to resulting huge decline in sample size especially in case of females, given that labour force participation rates are extremely low for females.

Another form of bias that may arise in the context of earning function is the issue of selectivity as we only have information on individuals who have chosen to work, since the behaviour of people who opt to work may be different than of those who stay out of labour force which can induce bias in our estimates. This form of bias will be more acute for females than males as traditionally females are kept out of labour force much more due to cultural factors and household responsibilities. To correct for the selectivity bias in literature the Heckman two step procedure has been suggested where a correction is made for self selection into employment on the basis of information about predicted value of probability of being employed on certain identifying determinants. However, the credibility of such an adjustment depends on the validity of identifying variables that should strongly predict the probability of being employed for the individual but not the wage that the person will get if he or she enters the labour force. In our data set the identifying variables that we can extract include number of children, number of old age members and whether one is married or not. These identifying variables may impact male and female participation differently. For example marriage may constrain female participation in labour force considering our cultural norms but for a male it may add responsibility on his shoulder and may induce him to work. Similarly, increase in number of children may induce the male to work more for wages so as to support his family but for a female it may add to her household responsibilities and may induce her to drop out from labour force especially when the proportion of young children or old dependents increases. Hence we would expect these identifying variables to affect participation of male and female in paid work differently. However, these identifying variables are not very credible since fertility itself is endogenous in decision making as the number of children a female may have varies for a female with higher ability and education than with lower ability and education, being less for the former. Also, the more able or educated female will have more wages and hence greater bargaining power within the household in terms of deciding how many children to have. Also if marriage-

making market is active with positive assortative matching, it may induce preference for less children for a couple who are both educated (both such husband and wife may also be more likely to be well-placed in terms of labour force with higher education) and may also translate into lesser fertility level for females in case preference of the male for an educated spouse are for higher quality of future children. Hence the number of children one has may not just affect the probability of being employed, especially for females, but may very well be in consequence of both schooling of parents and their wages. Further being married or not, number of aged dependents or number of children being the predictor of labour market participation will not be so clearly associated with a given female in our data set given the presence of much higher proportion of females belonging to a joint family setup and hence with shared responsibility as is prevalent in much of Pakistan. Therefore, given that we cannot meet the strict identifying restrictions for sample selectivity with available information in the data set being used, we do not attempt to correct for sample selection in our current paper and confine our work to OLS estimates of private rate of return conditional on employment.

6. DESCRIPTIVE ANALYSIS OF GENDER DIFFERENCES IN EARNING AND ENROLMENT PATTERNS

The exercise of calculating the demand functions and earning functions has been done on two distinct sets of individuals, one who falls in school going ages of primary (6–10), secondary (11–18) and tertiary levels (19–30) and the second, who fall in the age group of labour force participation (15–65) and are not currently enrolled in school. The mean values of variables used in schooling equation for male and female samples by enrolment and in earning function by schooling by region and finally by age cohort are given in Appendix Tables A.1– A.5 and A.9–A.15 respectively.

The pattern that comes clearly from the data of males and females in school going age group (6–30) is that on average females have a slightly higher level of enrolment that is .7127 compared to .6441 for males (Appendix Table A.1). However when we look deeper into the mean statistics by gender and by enrolment for the four provinces, as can be seen in appendix Table A.2, we find that the gender differential (M-F) in the mean level of enrolment pattern in favour of female population only stands for Punjab (–.0925*) while in the other three provinces enrolment outcomes tilt towards educating sons more than daughters on average; such a trend being most strong for Balochistan (.0557*) compared to Khyber Pakhtunkhwa (.0214*) and Sindh (.0153*). Hence though on average females may fare better than males in terms of enrolment, however such a pattern is coming primarily from the Punjab government's commitment to reducing gender disparities in education and perhaps less rigid cultural values of patriarchal control compared to the other three provinces as can be seen in the preference for son's education on average compared to daughters in the other three provinces. Further, the favourable gender difference in enrolment on average is emerging from urban sectors (–.0747*) being reflected mainly in primary school going age group (–.0279*) on average in contrast to secondary education age category (.0212*) and tertiary level age group (.0066***) where the mean gender difference shows that among enrolled group on average males are more enrolled than females.

In terms of determinants of schooling from descriptive figures in Table A.2, we do find that comparison of the enrolled group with those who are not enrolled reveals that they have a much higher level of parental education, much lower household size, joint family system, and finally comprise of younger head of the households; and this pattern is seen across both male and female population of enrolled and not enrolled children for age group 6–30. Further the average tendency in individuals belonging to enrolled group for both males and females compared to the not enrolled category having smaller family size, joint family setup, younger heads of households and finally with much higher levels of mother's and father's years of education can also be seen in the mean statistics by gender and enrolment for primary, secondary and tertiary age groupings as reported in Appendix Tables A.3, A.4 and A.5 respectively. Hence such differences may indeed show that increase in the size of the household may be creating binding resource constraints that are leading parents to take the child out of school. However this pattern is being mitigated to some extent in enrolled group for both males and females through much higher presence of joint family support system with shared family responsibilities compared to the non-enrolled sample which can be a likely possibility in our sample. Similarly on average more younger heads of households in the enrolled group compared to the non-enrolled for both males and females may imply that younger parental generation have much more focus on education of their children as compared to aged parents. Finally, the mean statistic of urban dummy by gender and enrolment reveal that there is higher proportion of kids living in urban localities in the group that are enrolled than those who do not go to school for females for age group 6-30 and this pattern is shown in the mean values at all three educational demarcation, while for males those living in urban areas are less on average among those enrolled compared to the non-enrolled group for the whole sample of 6-30 age group, however descriptive analysis by educational level shows the reverse pattern (Appendix Table A.2 to A.5). Therefore belonging to urban locality may indicate more likelihood of being enrolled due to easy and safe access to schooling especially for females is a plausible hypothesis.

Finally the most important plausible determinant for enrolment of a child that comes out from the mean estimates in Tables A.2 to A.5 is parental education. On average parental years of schooling are higher for both males and females for the enrolled group compared to the non-enrolled but the difference in mean years of schooling for father across the enrolled and not enrolled group for males and females comes to be 1.316* and 1.311* respectively which shows that on average father's education across the enrolled and not enrolled groups is slightly higher for males than females (Appendix Table A.2). However the difference in mean years of schooling for mothers across enrolled and not enrolled groups show much pronounced role for female enrolment compared to males (Appendix Table A.2: 1.396* for females and 0.816* for males). This pattern of much higher mean difference across enrolled and not enrolled groups for father's education for males and that for mother's education for females is shown in descriptive pattern at all levels of education though with varying degrees (Appendix Table A.3 to A.5). On examination of the mean statistics by gender and by enrolment in Appendix Tables A.2-A.5, it can be seen that among those individuals who are currently enrolled, it is the parental education that plays an important role. In case of females it is a testable hypothesis if the mother's education can be a determining factor of the daughter being sent to school while in case of males it is a likely empirical possibility based on the mean trends.

Looking into the mean values of variables used in the earning function in Table A.9, one finds that on average males earn slightly higher than females a mean value of 388.67 rupees compared to 214.79 rupees for females**.** Also not only do men on average earn almost twice as much as females, they have almost double years of schooling as compared to females (6.567 for men compared to 3.74 for females) though both average earnings and years of schooling are quite low for both males and females in Pakistan. This is not only so among the no schooling category for all levels—primary, secondary and tertiary—there are marked gender differences which show that females on average are clearly the disadvantaged group with 57.4 percent of population against 28.2 percent of the male population who have never attended school; and of those who have attended schools, the males outperform females at all levels of education (primary: 15.3 percent for males and 11.7 percent for females; secondary : 47 percent for males and 25.6 percent for females; tertiary: 9.3 percent for males and 5.1 percent for females). In terms of labour force participation also we find that 71.7 percent of males work while only 13.1 percent of females take part in paid work which may be an indication of the fact that culturally the primary role of bread earning falls on males and while females are mainly concerned with household responsibilities and child rearing activities. Also, if the selection in the labour force is not controlled in the estimation process it will create problems in terms of biased estimates for females than males, given such low labour force participation rate for females compared to males. When we calculate the mean difference in daily earnings and paid labour force participation proportions by schooling levels as presented in Appendix Tables A.10 and A.11, we find that that males on average earn more than females at all levels of education and the difference increases with the level. As to the trend in difference in participation in paid labour force, we find that on average males tend to have much higher participation rates than females but the difference declines slightly with education. The latter finding could be an indication of the fact that females who tend to pursue higher education come from such background which are more open to female working than those closed ones who either do not send to school or take them out of school early in education.

Another important aspect that needs to be understood and evaluated is how the labour market experience of males and females varies by different age groups. Since the older cohorts are at a different life cycle than the younger and the two may face varying labour market constraints, hence their experience in terms of returns to education may vary. To have an idea of the varying patterns across age cohorts, the mean level of daily wages (log values), years of schooling and participation into paid work by age cohort is presented in Appendix Table A.12. We can see from the averages presented in Appendix Table A.12 that males tend to earn more than females at each age cohort, have much higher levels of years of schooling and have substantially high levels of participation in the work force rates than females. However, within the male and female grouping we find that earning averages tend to initially increase and then decrease as we move up from younger to older age cohorts for both males and females, indicating possible concavity of earning profile with respect to age. The years of education on average are higher for the younger cohorts than the older ones for both sexes indicating that education is becoming more and more important for both males and females in the younger generation. In terms of participation in work, we find that though participation rates are much higher for males

than females in all age categories, but within male and female groups participation rates peak at 31-40 age cohort for both males and females and then decline indicating life cycle effects. In terms of the mean difference in daily earning and labour force participation rates by age cohort and by schooling level as presented in Appendix Tables A.13 and A.14, we can see that at almost all age groups and schooling levels males tend to earn more than females and tend to have much higher participation rates, though the gap in participation rates declines with increase in education level and show increasing and then declining trend across age cohorts for a given level of education, indicating again the life cycle effects.

Finally we also find the evidence of marked variation in average earnings and paid labour force participation rates of both males and females across provinces and across rural and urban divide as is evident from Appendix Table A.15, indicating the need to control for regional variations in our earning function regressions. One clear pattern that emerges from the mean statistics across the rural and urban divide in each province and for Pakistan is that males tend to earn more on average than females in each category, have much higher mean values of years of education and also have much higher participation rates in paid work than females.

7. EMPIRICAL RESULTS

The impact of being male on the probability of enrolment at primary, secondary and tertiary levels of education is presented in Appendix Tables A.6 –A.8. According to these findings, the empirical evidence of gender difference in education in favour of a male child is found most significantly at the secondary level and weak evidence is found at the primary. However at the tertiary level in our given sample females fare better in terms of their likelihood of enrolment than males. The estimated results for the reduced form demand function for enrolment shows that being male increases the likelihood of enrolment by 0.14 percent and 6.6 percent at the primary and secondary levels of schooling, though the result is significant only for the latter category, while it has negative insignificant effect on the probability of enrolment by a magnitude of 1.27 percent.

Table 7.1

Summary of Impact of Key Variables in Schooling Demand Equations on Probability of Enrolment by Gender

	Male			Female		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
Household Size	.00035	–.01002*	–.0004	0.0000	.0031	–.0059
Joint Setup	.00332	–.0258***	.00504	–.0013	.0063	.0285
Head's Age	.00019	–.00152***	–.00055	–.00032**	–.0015	–.0016
Father Sch.	.00084*	.01273*	.0089*	.00025	.01023*	.0147*
Mother Sch.	.00043	.01207*	.0065*	.00088***	.0265*	.0120*
Urban	.00114	.00371	.021	.0024	.0995*	.0653**
Punjab	–.00945**	–.0348*	.0208	.00027	.0958*	.0814*
KPK	.0032	.0883*	.0940*	.00048	.1205*	.2461*
Sindh	–.009	.02464	.0013	–.00215	.05024	.0667
Pseudo R-square	0.1125	0.1954	0.1831	0.1515	0.2140	0.1361
Proportion Attending School	.798	.763	0.185	.697	.722	0.279
N	5456	8132	6175	4091	5757	2656

While the significant and sizable effect of the greater likelihood of male enrolment at secondary level is established, the estimated findings concerning determinants of probability of enrolment at different levels of education do differ by gender. The summary of estimated findings for probability of enrolment at primary, secondary and tertiary level of education for males and females is presented in Table 7.1 above. In view of the budgetary constraint it is expected theoretically that increase in household size will increase the financial burden on parents and hence limited resources will lead to decrease in the likelihood of children's schooling. However the joint family factor may partly mitigate this impact in the sense that the responsibility of educating children will be shared among extended family members and if the number of earners is increasing more than the number of children then this may actually increase the probability of the child's enrolment. However, this is largely an empirical question and there can also be the possibility that belonging to a joint family set up could only increase the burden of dependence on the head and not so much as a means to enhance the financial pool of the household. A look at the descriptive measure for household size in Appendix Table A.2 would show that those who are enrolled whether male or female come from slightly lower household size on an average as compared to the group that does not go to school, hence increasing family size could create stringent budget constraints for the household and might affect enrolment negatively. However, the estimated findings for our given sample provide strong support of the above possibility only at the secondary level of education for males where the impact is negative and significant (–.01002*) while in the rest of the categories the evidence is mixed. The negative, though insignificant, impact of increasing family size is found at the tertiary level of education for both males and females, while at the primary level for males and primary and secondly level for females, the impact is positive though insignificant and of negligible magnitude. Belonging to joint family also only significantly affects the likelihood of enrolment for males at the secondary level of education (–.0258***) while in other categories for both male and female the impact is insignificant. Hence in this data set, it is not very clear that in face of scarcity and budget constraints with increasing family size when household has to decide between education of a son and a daughter, who they will prefer to send to school as strong evidence of binding resource constraints is found only at secondary level of education for males while in the rest of the categories not only the impact is insignificant but there is marginal difference across gender.

As a proxy of patriarchal rigidity in the values system due to which parents may favour son's education over the daughter's, the head's age is controlled for in the above model. As can be seen in the above table, increasing the head's age decreases the probability of enrolment for both males and females at all levels of education except the primary level for males (though the impact is significant only at secondary level for males and primary level for females). This shows that education of children is much more of priority for parents of younger ages than older ones. Further, in terms of magnitude, the impact is always greater for females than males showing that increase in the head's age decreases female enrolment likelihood more than that of the males, showing that older age group may prefer to educate their sons more than the daughters. Also, it can be seen in the above table that the urban dummy has positive impact for both males and females at each level of education which is in line with our hypothesis of using urbanisation as a proxy for availability of educational infrastructure. However this impact

is found to be significant only for females at the secondary and tertiary levels of education. Further, the effect of belonging to an urban centre on females shows a sizable magnitude compared to males at all levels of education and this significant sizable response to urban dummy could be due to much easier access to education for females in urban areas as compared to a rural setting.

The most important finding of the current study is that the key variable that impacts enrolment positively across gender at all levels is parental education as can be seen in table 7.1 above. Parental education plays the most important role in a child's future. Not only the educational base of the parents defines their socioeconomic status but also their capacity to invest or not invest in the child's human capital building process whether it is in the form of their educational goals or in terms of their healthy physical and psychological growth. Further, from the policy perspective another important aspect that needs to be understood concerns parents, that is, the impact of a mother's versus a father's education on the child's schooling prospects and if so then what is the magnitude of such an impact. Hence if one finds evidence in favour of greater effective role of one parent as opposed to the other, say a mother, then it may provide rationale for who to target as the prime beneficiary in cash transfer programmes such as Benazir Income Support Programme with the objective that cash be utilised efficiently for the welfare of children in households. Both father's and mother's education has significant positive impact on education of both males and females at each level of education except the impact of father's schooling and that of mothers at primary level of schooling (positive but insignificant) for female and males respectively. Further one can see in Table 7.1 that at primary and secondary level of education, the mother's education has much more impact in terms of magnitude for females compared to father's education while the reverse patterns stand for the father's education which has greater impact compared to the mother's years of schooling for males at all levels of education. For males, unit increase in year of education of a mother increases the probability of enrolment by 0.043 percent, 1.207 percent and 0.0065 percent at primary, secondary and tertiary levels of education respectively while a unit increase in father's education increases the likelihood of enrolment by 0.084 percent, 1.273 percent and 0.89 percent at these respective level. For females, contrary to the results for males, the mother's education has been found to play more important part in educational prospects of a female. An increase of a year in mother's schooling increases the likelihood of enrolment of a daughter by 0.088 percent and 2.65 percent which is higher in magnitude than the respective impact of unit increase in the father's education that has been estimated to have an impact of 0.025 percent and 1.023 percent on female enrolment at primary and secondary educational levels. Hence the above finding shows that parental educational background has significant influence on the schooling preferences for children. Though the education of parents has positive impact on education of each child irrespective of the gender, however, the role of the mother's education is most vital for education of daughters and that of the father's is most important in education of their sons at all levels of education but of daughters at the tertiary level. Our results are somewhat similar to findings in Hamid and Siddiqui (2001) in which demand for schooling by gender is studied for three major cities of Pakistan i.e., Faisalabad, Sialkot and Karachi and it is found that increase in father's education raises the schooling of both sons and daughters but mother's education has significant impact only on daughters' schooling. Similarly the role of parental education in defining the

schooling outcomes of children, as is evident from findings of the study in hand, is also supported by empirical evidence presented in Saqib (2004), whereby it is found that there is much higher likelihood of a male child attending primary school compared to a female child and that this likelihood of enrolment increases for children with educated fathers in rural Pakistan.

Before looking into estimated rates of returns across male and female let us analyse the mean characteristics of the sample used to calculate such returns as presented in Table A.9 in the Appendix. We can see from the Appendix Table A.9 that the proportion of the males working for wages are much more than females (71.7 percent for males, 13.1 percent for females). Hence a much higher proportion of females is choosing not to work as compared to males, hence the selectivity bias would be a greater significant problem for females in view of the low labour force participation rate for females as compared to males. However due to non-availability of proper identifying variables to be used as basis for selectivity control, we confine our estimation to OLS regression. Further, non-availability of proper control for ability and quality of education may bias the estimates upward for males and females.[6] Hence before discussing the estimated results for private rate of return by gender, it is important to recognise the above mentioned caveats in these estimates which are primarily arising because of non-availability of data and restriction.

Table 7.2

Summary of Impact of Schooling Coefficients on Log(Wages) by Gender (OLS)

	Years	Primary	Secondary	Tertiary
Male	.0476	0.1216	0.2124	0.5437
Female	.083	0.22	0.3	0.837

The summary of the rate of return is presented in Table 7.2 above. We can see that returns to years of schooling for males and females turn out to be 4.76 percent and 8.3 percent. Therefore we conclude that on average females get higher return to a year of education than males. Also it is evident that return to education is higher for females than for males at all levels of education: primary, secondary and tertiary levels and also returns to education increase as educational levels increase both for male and females and the incremental increase is slightly more for males than female as one moves from primary to secondary level of education, but there is sizable jump for females than males as one moves from secondary to tertiary level of education. This finding that returns to education are higher for females than males and the earning function is convex with respect to education is in line with previous research on returns to education in Pakistan that includes Hamdani (1977), Haque (1977), Guisinger, Henderson and Scully (1984), Khan and Irfan (1985), Shabbir (1991), Shabbir and Khan (1991), Ashraf and Ashraf

[6]We provide fixed effects estimates in Appendix table that show returns estimate decline considerably for both male and female when sample using deviation from sibling mean is used so as to control for community and household unobserved common impacts that may be biasing the OLS results. For males the sample is confined to families with two or more brothers and for females the sample is restricted to household with two or more sisters so as to control for any gender effects in ability. However, we will not use these estimates for analysis due to sizable reduction in sample size especially for female.

(1993a, 1993b), Shabbir (1994), Nasir (1998), Nasir (2002) and Aslam (2005). Also looking into the pattern across various age cohorts as presented in table 7.3, we again see that returns to schooling for females are higher than for males at all levels of education across all age cohorts except for a few anomalies. Also there is evidence of successive increase in returns with increase in education levels for both males and females in younger age cohorts (21–30 and 31–40) that are most relevant for current and future schooling decision.

Table 7.3

Summary of Gender and Cohort Specific Rate of Returns

	15–20	21–30	31–40	41–50	51–65
			Female		
Years	.0108	.069	.097	.122	.142
Primary	.057	.087	.173	.20	.359
Secondary	0.045	0.302	0.408	0.666	0.691
Tertiary	–0.074	0.613	1.069	1.114	1.45
			Male		
Years	.011	.035	.051	.057	.069
Primary	0.0574	0.036	0.134	0.156	0.188
Secondary	0.0446	0.164	0.256	0.304	0.346
Tertiary	–0.074	0.479	0.478	0.5	0.716

Before drawing any policy implications, we need to acknowledge that on average males earn more than females as shown by descriptive statistics in Appendix Table A.9 (though this is not reflected in our constant terms of Mincerian earning function by gender), However evidence of higher private rate of return to years of education and at each level of education (primary, secondary and tertiary) for females than males implies that among those females who are educated they enjoy much higher returns than those females who are less educated in comparison to how much their educated male counterpart earns compared to the less-educated. These higher returns for females are showing because of lower presence of educated females at each educational level as compared to males, as can be seen in Appendix Table A.9. Further, such returns increase with the increasing education level for both males and females. There are several policy implications of convexity of the education-earnings profile. Firstly, the higher return at lower education levels argument has often been used to justify allocating funds to expand primary education [Psacharopoulos and Woodhall (1985)]. The presented evidence at first glance may appear to be in contrast to prevailing logic of achieving universal primary education targets first as a policy focus and then moving on to investments in higher level of education. However here one should notice that these estimates are private rate of return estimates and do not take account of social costs and benefits. Hence making a policy consensus on these estimates will be misleading.

Further, the presence of convex education earning profiles may reflect un-met demand within industry-sectors for high-skilled labour and policy makers may need to promote high-skill level education as well as adopt policies which encourage these individuals to participate in the labour market (especially women). Secondly, convexity

has implications for increasing education inequality. If private returns to schooling increase with higher education, poorer families which educate their children up to only primary education for example, because of their inability to borrow against future income and then being risk averse, are led to invest in shorter term quick yielding investment, will face lower private returns while richer families which educate children up to higher levels because of intergenerational class maintenance motives, will reap higher private returns. Consequently, the poor are less motivated to educate their children and may also send only the more able children to school for whom returns are higher or who culturally will be able to contribute more to households. Consequently, education and earnings differentials may widen both across families and within families and across the gender divide within families given the differential incentive the same future distribution of returns to schooling will generate for parents with poorer or wealthier background. This impact may be more pronounced for males than females especially among poor families who do not invest in education for class maintenance purposes but rather for the benefits that will accrue to them as a household. This is so in a traditional society like Pakistan's where parents rely more on their sons than daughters for their old age support. This is in accordance with the social norms that prevail in patriarchal societies according to which the daughter after marriage is culturally responsible for her in-laws and not the paternal relations. So even if women work after marriage (which is also quite small in Pakistan due to cultural taboos) the proportion that will be spent on the care of their parents will be much less compared to the men's. Also the wages the females receive for the same amount of work compared to males may be lower due to labour market discrimination. Hence even if returns to education may increase by education level for both males and females, part of the return from children's education that will benefit parents more in future will be more for sons than daughters.

8. CONCLUSION

In this paper using estimates of schooling demand function and private rate of return to education by gender, an attempt has been made to examine if there is any dynamics that will define a differential behaviour across gender in enrolment and if so then what can be the possible cause of such discrepancies and how can they be reduced. The first set of analysis focussed on the estimates of probability of enrolment at primary, secondary and tertiary levels of education by gender. Strong evidence for higher likelihood of enrolment for the male emerges only at the secondary level of education. However, the impact of determinants for these schooling demand functions at different levels of education differ by gender. One such key variable is parental education, whereby much more pronounced role of the mother's education is found in increasing the likelihood of enrolment for females at primary and secondary levels of education and that of the father's education for males at all levels of education and at tertiary level for females. Hence investing in female education today not only will empower females today but as a positive externality will also lead to gender equity in future. Besides this intergenerational externality of investment in female education, the above finding helps in identifying that in case of conditional cash programmes if mothers are targeted as policy tool then this can be one plausible measure to increase current female enrolment. The second set of analysis tried to highlight how gender imbalance in attained level of

education and much lower level of female labour force participation led to discrepancies in private rate of return to education by gender. The varied estimates show that such deviations are arising because females who are participating in labour market are on average much less educated than males and hence having higher rates of returns than males which again emphasises the need for a policy focussed on targets such as reducing gender differences in enrolment at all levels of education—primary, secondary and tertiary.

Further, the presence of convex education earning profiles may point to un-met demand within industry-sectors for high-skilled labour and policy makers may need to promote high-skill level education as well as adopt policies which encourage these individuals to participate in the labour market (especially women). Secondly, convexity has implications for increasing education inequality. If private returns to schooling increase with higher education, poorer families which educate their children only up to the primary level because of their inability to borrow against future income. Also being risk averse they invest in short term works that yield quick returns as a result they face lower private returns while richer families who educate children up to higher levels because of intergenerational class maintenance motives reap higher private returns. Consequently, the poor are less motivated to educate their children and may send only the more able children to school for whom returns are higher or who culturally will be able to contribute more to household such as a son who is not only expected to serve parents in old age but will most likely receive more reward for the same amount of work due to labour market discrimination. Consequently, education and earnings differentials may widen both across families and within families and across the gender divide within families given the differential incentive the same future distribution of returns to schooling will generate for parents with poorer or wealthier background.

APPENDIX

Educational System Profile in Pakistan

Levels	Categorisation	Grades	Age Group	Subjects Taught	Duration
Pre-school	Pre-school	Play Group, Nursery, Kindergarten (KG)	3-5	Elementary skills	3 years
Primary	Primary	1-5	6-10	Elementary skill development in Urdu, English, Mathematics, Arts, Science, Social Studies, Islamiyat and Geography	5 years
Secondary	Middle	6-8	11-13	Urdu, English, Mathematics, Arts, Science, Social Studies, Islamiyat and sometimes Computer Studies. Additional courses on language such as Turkish, Arabic, Persian, French and Chinese are taught depending on institution	3 years
	High (Matric)	9-10	14-16	Eight courses in total compulsory subject: (Mathematics, English, Urdu, Islamiyat and Pakistan Studies) Elective subject (Biology, Chemistry, Physics and Computer)	2 years
	Intermediate/ Higher Secondary (FSc/FA)	11-12	17-18	Groups choice (pre-medical, pre-engineering, humanities and commerce) Each group consists of three electives and as well as three compulsory subject of English, Urdu, Islamiyat (grade 11 only) and Pakistan Studies (Grade 12 only).	2 years
Tertiary	Professional college/University for Bachelor's degree courses	Undergraduate / Graduate /post graduate degree	19-30	Engineering (B.Engg/BS Engg), medicine (MBBS), dentistry (BDS), veterinary medicine (DVM), law (LLB), architecture (B.Arch), pharmacy (Pharm-D) and nursing (B.Nurs).	4 to 5 years
	University	Bachelors (Pass) Bachelor of Arts (BA), Bachelor of Science (B.Sc), Bachelor of Commerce (B.Com).		Students normally read three optional subjects (such mathematics, statistics and Economics combination etc) in addition to almost equal number of compulsory subject such as English and Pakistan Studies	2 years
		Bachelor (Honors)		Students normally specialise in a chosen field of study	3 to 4 years
		Master degree		Field will be defined according to Bachelor education	2 years
		Masters in Philosophy (M.Phil)		Field will be defined according to master degree	Minimum 2 years
		Doctor of Philosophy (PhD)		Field will be defined according to Master/Mphil. Degree	Minimum 2 years

Table A.1

Mean of Variables Used in Demand Function for Schooling by Gender

	Male (M)	Female (F)	Difference (M-F)
Enroll	.6441	.7127	–.0685*
Father Years of Schooling	5.238	5.9597	–.7215*
Mother Years of Schooling	2.0771	2.846	–.7693*
Household Size	7.341	7.197	.1438*
Joint Setup	.6369	.7117	–.0748*
Head's Age	48.58	47.20	1.377*
Primary Education (Grade 1–5: Age Group 6–10)	.2760	.3271	–.0511039*
Secondary Education (Grade 6–12: Age Group 11–17)	.4114	.4604	–.0489
Tertiary Education (University Education Under-graduate, Graduate and Post-graduate: Age Group 18–30)	.3124	.212	.1000*
Urban	.4380	.4988	–.0607*
Punjab	.4081	.4893	–.0811*
Sindh	.2268	.2169	.0098**
Khyber Pakhtunkhwa	.2097	.1924	.0172*
Balochistan	.1552	.1011	.0540*
N	**19,763**	**12,504**	

Table A.2

Mean of Variables used in Schooling Equation by Gender and Enrolment (Age Group: 6–30)

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	5.70	6.336	–.6297*	4.390	5.025	–.635*	1.316*	1.311*
Mother Years of Schooling	2.367	3.247	–.8799*	1.551	1.851	–.300*	0.816*	1.396*
Household Size	7.092	7.095	–.0028	7.79	7.44	.341*	–0.698*	–0.345*
Joint Setup	.7146	.7350	.0204*	.496	.653	–.157*	0.2183*	0.081*
Head's Age	45.36	45.11	.2541**	54.40	52.39	2.007*	–9.04*	–7.28*
Punjab	.3846	.4772	–.0925*	.4507	.5194	–.0686*	–0.066*	–0.042*
KPK	.2218	.2004	.0214*	.1878	.1728	.0149*	0.034*	0.0275*
Balochistan	.1693	.1135	.0557*	.1296	.0704	.0592*	0.0397*	0.0431*
Sindh	.2241	.2088	.0153*	.2316	.2371	–.005*	–0.0075	–0.028*
Prim. Age Group (5–10)	.4228	.4507	–.0279*	.0103	.0206	–.0102*	0.4125*	0.4301*
Sec. Age Group (11–17)	.4874	.4662	.0212*	.2738	.445	–.172*	0.2136*	0.0212*
Tertiary Age Group (18–25)	.0897	.0830	.0066***	.7157	.5334	.1823*	–0.626*	–0.450*
Urban	.429	.5039	–.0747*	.4540	.4860	–.0320*	–0.025*	0.017***
N	12,731	8,912		7,032	3,592			

Table A.3

Mean of Variables Used in Schooling Equation by Gender and Enrolment (Age 6–10)

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	5.245	5.830	–.585*	2.904	5.418	–2.514**	2.341*	0.412
Mother Years of Schooling	2.205	2.797	–.5917*	2.191	2.189	.0025	0.014	0.608
Household Size	6.780	6.893	–.112**	7.109	7.472	–.363	–0.329	–0.579**
Joint Setup	.7423	.7443	–.0019	.7671	.7027	.064	–0.0248	0.0416
Head's Age	41.63	41.73	–.0986	42.45	45.51	–3.061**	–0.82	–3.78*
Punjab	.3789	.4363	–.0574*	.5342	.3648	.169**	–0.155*	0.0715
KPK	.201	.189	.011***	.0684	.2027	–.134**	0.133*	–0.0137
Balochistan	.1833	.1476	.035*	.1506	.1621	–.0114	0.0327	–0.0145
Sindh	.236	.226	.009	.2465	.2702	–.0236	–0.0105	–0.0442
Urban	.3838	.4187	–.0349*	.3013	.2432	.0581	0.083	0.1755*
N	5,383	4,017		73	74			

Table A.4

Mean of Variables Used in Schooling Equation by Gender and Enrolment (Age 11–18)

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	5.682	6.48	.8007*	3.327	4.305	–.9781*	2.355*	2.175*
Mother Years of Schooling	2.247	3.394	–1.146*	1.089	1.199	–.1099	1.158*	2.195*
Household Size	7.297	7.315	–.0175	7.579	7.552	.0275	–0.282*	–0.237*
Joint Setup	.7136	.7335	–.0199**	.676	.696	–.0194	0.0371*	0.0375*
Head's Age	47.044	46.889	.1545	49.62	49.16	.4673***	–2.58*	–2.271*
Punjab	.379	.5030	–.1236*	.4589	.4700	–.011	–0.079**	0.033**
KPK	.2378	.2086	.0291*	.1645	.1916	–.0270**	0.0733*	0.017
Balochistan	.1693	.0931	.0762*	.1495	.0955	.0540*	0.019**	–0.0024
Sindh	.2135	.1951	.0183**	.2268	.2428	–.0159	–0.0133	–0.047*
Urban	.434	.5487	–.114*	.3733	.377	–.004	0.0607*	0.171*
N	6206	4155		1926	1602			

Table A.5

Mean of Variables Used in Schooling Equation by Gender and Enrolment (Age 19–30)

	Enrolled (E)			Not Enrolled (NE)			Difference (E-NE)	
	Male (M)	Female (F)	Diff. (M-F)	Male (M)	Female (F)	Diff. (M-F)	Male	Female
Father Years of Schooling	8.012	8.256	–.2444	4.818	5.612	–.793*	3.194*	2.644*
Mother Years of Schooling	3.781	4.864	–1.0829*	1.718	2.38	–.6646*	2.063*	2.484*
Household Size	7.44	6.96	.488*	7.881	7.363	.5187*	–0.432*	–0.403*
Joint Setup	.589	.693	–.1039*	.4234	.6169	–.1935	0.165*	0.076*
Head's Age	53.80	53.43	.369	56.40	55.36	1.036*	–2.59*	–1.93*
Punjab	.4404	.5540	.1135*	.4464	.5668	–.1203*	–0.0059	–0.0128
KPK	.232	.2135	.0185	.1984	.1560	.0424*	0.0336**	0.0575*
Balochistan	.103	.043	.060*	.1217	.0459	.0758*	–0.018***	–0.0026
Sindh	.224	.189	.034**	.233	.231	.0020	–0.009	–0.042**
Urban	.616	.714	–.098*	.4871	.5861	–.098*	0.129*	0.128*
N	1142	740		5033	1916			

Table A.6

Maximum Likelihood Logit Estimates of The Probability of Being Enrolled in School, Ages 6–10

Variables	Male	Female	Total
Male			.0014
Household Size	.00035	2.16e-06	.00023
Joint System	.00332	–.0013	.00076
Head Age	.00019	–.00032**	–.0001
Father Years of Schooling	.000838*	.00025	.000617*
Mother Years of Schooling	.000434	.00088***	.00075***
Urban	.00114	.0024	.0020
Punjab	–.00945**	.00027	–.00512
Khyber Pakhtunkhwa	.0032	.00048	.0008
Sindh	–.009	–.00215	–.0060
Age7	–.0131	–.0041	–.009
Age8	–.0359	–.0449	–.0427***
Age 9	–.0557	–.0509	–.0579
Age 10	–.0820	–.0873***	–.09**
Pseudo R-sq	0.1125	0.1515	0.1085
Proportion Attending School	.798	.697	.75
N	5456	4091	9547

Note: The p-value significant at 5 percent and 10 percent are indicated by * and ** respectively. All coefficients are normalised to reflect marginal effects. Dependent variable is Enrol equals 1 if enrolled and 0 otherwise.

Table A.7

Maximum Likelihood Logit Estimates of the Probability of Being Enrolled in School, Ages 11–18

Variables	Male	Female	Total
Male			.065600*
Household Size	–.0100166*	.0031	–.00368
Joint System	–.0258002***	.0063	–.010847
Head's Age	–.0015227***	–.0015	–.0016*
Father Years of Schooling	.0127268*	.01023*	.011399*
Mother Years of Schooling	.012074*	.0265*	.0189*
Urban	.0037107	.0995*	.0434*
Punjab	–.0348217*	.09582*	.0155
Khyber Pakhtunkhwa	.0882743*	.1205*	.1002*
Balochistan	.0246407	.05024	.0396**
Age12	–.125203**	–.2639*	–.1898*
Age13	–.2065579*	–.3019*	–.2527*
Age14	–.2980632*	–.4541*	–.3719*
Age15	–.4246711*	–.5291*	–.4742*
Age 16	–.511163*	–.6101*	–.5563*
Age 17	–.585171*	–.6634*	–.62163*
Age 18	–.6898523*	–.7279*	–.706*
Pseudo R-sq	0.1954	0.2140	0.1962
Proportion Attending School	.763	.722	.745
N	8132	5757	13889

Note: The p-value significant at 5 percent and 10 percent are indicated by * and ** respectively. All coefficients are normalised to reflect marginal effects. Dependent variable is Enroll equals 1 if enrolled and 0 otherwise.

Table A.8

Maximum Likelihood Logit Estimates of The Probability of Being Enrolled in School, Ages 19–30

Variables	Male	Female	Total
Male			–.0127
Household Size	–.0004	–.0059	–.0017
Joint System	.00504	.0285	.0119
Head's Age	–.00055	–.0016	–.00087
Father Years of Schooling	.0089*	.0147*	.01066*
Mother Years of Schooling	.0065*	.0120*	.00827*
Urban	.021	.0653**	.0324**
Punjab	.0208	.08144*	.0376*
Khyber Pakhtunkhwa	.0940*	.2461*	.1383*
Balochistan	.0013	.0667	.0160
Age 20	–.0457*	–.0487**	–.0471*
Age 21	–.0519*	–.0804*	–.0611*
Age 22	–.0836*	–.1339*	–.0989*
Age 23	–.0941*	–.1293*	–.10601*
Age 24	–.0908*	–.1425*	–.1064*
Age25	–.1120*	–.1452*	–.12521*
Age 26	–.1161*	–.2062*	–.1412*
Age 27	–.1129*	–.1948*	–.1367*
Age 28	–.1250*	–.1989*	–.1471*
Age 29	–.11504*	–.1836*	–.13767*
Age 30	–.13535*	–.1797*	–.1539*
Pseudo R-sq	0.1831	0.1361	0.1699
Proportion Attending School	0.185	0.279	0.213
N	6175	2656	8831

Note: The p-value significant at 5 percent and 10 percent are indicated by * and ** respectively. All coefficients are normalised to reflect marginal effects. Dependent variable is Enrol equals 1 if enrolled and 0 otherwise.

Table A.9

Mean of Variables Used in Earnings Function, Aged 15–65 by Gender

	Male (M)	Female (F)	Difference (M-F)
Daily Wage	388.67	214.79	173.87*
Log (Daily Wage)	5.707	4.86	.844*
Yrs. of Schooling	6.567	3.74	2.821*
No Schooling	.282	.574	–.291*
Primary	.153	.117	.036*
Secondary	.47	.256	.213*
Tertiary	.093	.051	.042*
Work Participation	.717	.131	.585*
Age	31.46	32.80	–1.33*
Urban	.461	.421	.04*
Punjab	.39	.42	–.0298*
Sindh	.266	.246	.019*
~~NWFP~~KPK	.18	.201	–.018*
Balochistan	.160	.13	.028*
N for Log Wage	17403	2047	
N for Rest of Variables	27,956	29,801	

Table A.10

Mean Daily Earnings of Male and Females by Schooling Level

	Male (M)	Female (F)	Difference (M-F)
No Schooling	271.57	108.0	163.56*
Primary	297.31	122.4	174.85*
Secondary	404.44	210.49	193.9*
Tertiary	830.14	518.27	311.86*

Table A.11

Paid Labour Force Participation Rates by Gender and Schooling Level

	Male (M)	Female (F)	Difference (M-F)
No Schooling	.8267	.1479	.6787*
Primary	.7952	.1067	.6884*
Secondary	.6159	.0767	.5391*
Tertiary	.766	.274	.4927*

Table A.12

Mean Statistics of Male and Females by Age Cohorts

	Male Log Wage	Female Log Wage	Diff. (Log Wage) (M-F)	Male Yrs Sch.	Female Yrs Sch.	Diff. (Years Schooling) (M-F)	Male Work, WPm	Female Work, WPf	Difference Work Participation (WPm-WPf)
15–20	5.137	4.452	.685*	6.505	5.169	1.335*	.4117	.0875	.324*
21–30	5.546	4.91	.6288*	7.360	5.02	2.33*	.8063	.1382	.668*
31–40	5.874	4.857	1.01*	6.789	3.023	3.76*	.948	.17	.778*
41–50	5.987	4.993	.994*	5.927	2.085	3.84*	.923	.156	.767*
51–60	5.962	5.055	.907*	5.296	1.5	3.79*	.755	.124	.630*
61–65	5.72	4.35	1.365*	5.01	.955	4.06*	.455	.0655	.389*

Table A.13

Mean Difference (M-F) in Daily Earnings of Male and Females by Age Cohort

	15–30	31–40	41–50	51–65
No Schooling	.8610*	1.16*	1.2*	.94*
Primary	.76*	1.19*	1.038*	.91*
Secondary	.723*	.907*	.5697*	.396***
Tertiary	.566*	.3607*	.033*	–.117

Table A.14

Mean Difference in Paid Labour Force Participation Rates of Males and Females by Age Cohort and Schooling Level

	15–30	31–40	41–50	51–65
No schooling	.67*	.779*	.751*	.534*
Primary	.636*	.823*	.833*	.627*
Secondary	.431*	.814*	.803*	.615*
Tertiary	.343*	.624*	.568*	.410*

Table A.15

Mean of Variables Used in Earnings Function, Aged 15–65 by Gender and Regions

		Male			Female		
		Logwage	Yrs sch.	Work	Logwage	Yrs sch.	Work
Punjab	Rural	5.52	5.64	.743	4.61	3.21	.236
	Urban	5.85	7.66	.71	4.99	6.71	.113
Sindh	Rural	5.44	5.04	.77	1.37	4.55	.17
	Urban	5.86	7.960	.731	5.81	5.01	.094
KPK	Rural	5.65	6.48	.614	4.961	2.19	.080
	Urban	5.76	8.08	.641	5.24	4.85	.068
Balochistan	Rural	5.69	4.26	.763	5.06	.717	.033
	Urban	5.91	7.24	.678	5.62	2.98	.047
Pakistan	Rural	5.56	5.44	.729	4.61	2.23	.159
	Urban	5.86	7.86	.703	5.09	5.82	.092

Table A.16

Mincerian Earnings Functions, (Males and Females), with Years of Education and Levels of Education (15–65)

	Male				Female			
	Years		Level		Years		Level	
Variables	OLS	Fixed	OLS	Fixed	OLS	Fixed	OLS	Fixed
Constant	3.59 *	–0.00	3.66*	–0.00	3.62 *	0.00	3.748*	0.00
Yrs Sch	.0476*	.009**			.083 *	.0106		
Primary			.1216*	.004			.220*	–.027
Secondary			.334*	–.0092			.52*	–.187
Tertiary			.8777*	.122			1.357*	.210
Age	.081 *	.0307*	.0809*	.030*	.0318 *	.008	.028*	.002
Age Square	–.0008 *	–0.00	–.0008*	–0.00	–.0001	0.00	–.0001	0.00
Urban	.199 *		.207*		.046		.087	
Punjab	.0087 *		.011		–.144 *		–.138**	
KPK	.063 *		.062**		–.086		–.090	
Balochistan	.169 *		.158*		.292**		.335	
R sq	0.3610	0.104	0.3654	0.1043	0.316	0.0083	0.3227	0.10
N	17402	3617	17403	3617	2047	208	2047	208

Note: The p-value significant at 1 percent, 5 percent and 10 percent are indicated by * , ** and *** respectively.

Table A.17

Summary of Private Rate of Returns (OLS/FE)

	Male		Female	
	OLS	FE	OLS	FE
Years	.0476	0.009	.083	.0106
Primary	0.1216	0.004	0.22	–.027
Secondary	0.2124	–0.0132	0.3	–0.16
Tertiary	0.5437	0.1312	0.837	0.3970

Table A.18

Estimates of Earnings Functions by Cohorts for Males, Years and Levels of Education (OLS)

	15–20		21–30		31–40		41–50		51–65	
	Year	Level	Year	Level	Year	Level	Year	Level	Year	Level
Const.	.58	.64	4.62*	4.76*	3.47**	3.10***	5.22***	4.94***	3.56	1.92
Yrs	.011*		.035*		.051*		.057*		.069*	
Prim.		.0574		.036		.134*		.156*		.188*
Sec		.102*		.20*		.390*		.46*		.534*
Tert.		.028		.679*		.868*		.96*		1.25*
Age	.41**	.40***	.011	.006	.075	.1	.009	.02	.086	.142
Age Square	–.009	–.008	.0004	.0005*	–.0006	–.001	–.00	–.00	–.00	–.001
Urban	–.005	–.004	.148*	.152*	.24*	.246*	.28*	.30*	.286*	.30*
Punjab	–.009	–.014	.05**	.05**	.029	.034	–.04	–.036	–.00	.009
KPK	.026	.022	.07**	.07**	.06***	.055	.11*	.09**	.13***	.137*
Bal.	.222	.226*	.157*	.144*	.21*	.196*	.10*	.11*	.21***	.19*
R sq.	0.087	0.087	0.177	0.19	0.301	0.299	0.34	0.337	0.37	0.375
N	2274	2275	5262	5262	4243	4243	3419	3419	2204	2204

Note: The p–value significant at 1 percent, 5 percent and 10 percent are indicated by * , ** and *** respectively.

Table A.19

Estimates of Earnings Functions by Cohorts for Females, Years and Levels of Education (OLS)

	15–20		21–30		31–40		41–50		51–65	
	Year	Level	Year	Level	Year	Level	Year	Level	Year	Level
Const.	.58	.64	3.02	3.84	6.84	5.94	–10.3	–8.05	–3.7	–2.67
Yrs	.0108*		.069*		.097*		.122*		.142*	
Prim.		.057		.087		.173		.20		.359
Sec		.102*		.389*		.581*		.866*		1.05*
Tert.		.028		1.002*		1.65*		1.98*		2.50*
Age	.4***	.4***	.059	.003	–.187	–.136	.64	.549	.323	.293
Age Square	–.009	–.008	–.0001	.0008	.003	.002	–.006	–.005	–.003	–.003
Urban	–.005	–.004	.025	.089	–.018	.017	.138	.22***	–.047	–.07
Punjab	–.009	–.014	–.18**	–.146**	–.033	–.035	–.113	–.089	–.246*	–.288**
KPK	.026	.02	–.12	–.06	.005	–.018	–.166	–.157	.410	.459
Bal.	.22*	.22*	.32**	.46***	.24	.223	.110	.225	–.489**	–.545**
R sq.	0.087	0.087	0.30	0.295	0.355	0.374	0.494	0.494	0.5029	0.51
N	2274	2275	684	684	554	554	339	339	208	208

Note: The p-value significant at 1 percent, 5 percent and 10 percent are indicated by * , ** and *** respectively.

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Estimating Standard Error of Inflation Rate in Pakistan: A Stochastic Approach

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"The answer to the question what is the mean of a given set of magnitudes cannot in general be found, unless there is given also the object for the sake of which a mean value is required. There are as many kinds of average as many purposes; and we may almost say in the matter of prices as many purposes as many writers." Edgeworth (1888).

We estimate standard errors (S.Es.) of month on month and year on year inflation in Pakistan based on data for the period of July 2001 to June 2010 using the stochastic approach as well as extended stochastic approach to index numbers. We develop a mechanism to estimate S.E. of period average headline inflation (rate) using these approaches. This mechanism is then applied to estimate S.Es. of 12-month average rate of inflation in Pakistan for July 2003 to June 2010. The systematic changes in the relative prices of different groups in the CPI basket for Pakistan are also estimated. The highest (positive) relative price inflation occurred in 'food, beverages and tobacco' group and the lowest (negative) for 'recreation and entertainment' group, during fiscal years 2001 to 2010.

JEL classification: C13, C43, E31
Keywords: Estimation, Index Numbers, Inflation Rate, Standard Error

1. INTRODUCTION

The stochastic approach to index numbers has recently attracted renewed attention of researchers as it provides the standard error of index number (and its growth). One of the most important uses of index number is in the case of measurement of the general price level in an economy (and then inflation, of course). This approach has been applied to measure the rate of inflation[1] in studies like Clement and Izan (1987), Selvanathan

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[1]In rest of the paper we would prefer to use the term 'inflation' instead of the 'rate of inflation' or 'inflation rate,' for brevity.

(1989), Crompton (2000), Selvanathan (2003), Selvanathan and Selvanathan (2004), and Clement and Selvanathan (2007).

Historically, there are two main approaches to measure the index number: the functional approach and the stochastic approach. In the functional approach, prices and quantities of various goods and services are considered as connected by certain typical observable relationship [Frisch (1936)]. The stochastic approach is less well known although it has a long history dating back to Jevons (1865) and Edgeworth (1888). In the stochastic approach prices and quantities are considered as two sets of independent variables. It assumes that (ideally) individual prices ought to change in the same proportion from one point of time to the other. This assumption is based upon the quantity theory of money—as the quantity of money increases all prices should increase proportionally. Any deviation of individual prices from such proportionality is seen as 'errors of observation' and/or may be the result of non-monetary factors' effect on prices. Thus the rate of inflation can be calculated by averaging over the proportionate changes in the prices of all individual goods and services. Keynes (1930) criticised the equiproportionate assumption as being 'root and cause erroneous'. In the functional approach the deviations from proportionality are taken as expressions for those economic relations that serve to give economic meaning to index numbers [Frisch (1936)].

The recent interest of researchers in the stochastic approach to index number theory is led by Balk (1980), Clements and Izan (1981, 1987), Bryan and Cecchetti (1993) and Selvanathan and Rao (1994). Clements and Izan (1987) recognised the Keynes (1930) criticism on the assumption of identical systematic changes in prices and viewed the underlying[2] rate of inflation as an unknown parameter to be estimated from the individual price changes by linking the index number theory to regression analysis.

Again, using the functional approach to index numbers we obtain an estimate of the inflation rate without knowing its distribution. Thus, we have no basis to make any statistical comment, say about 'efficiency,' of the estimated inflation rate for which we shall also need the standard error of the estimated rate. The stochastic approach leads to familiar index number formulae such as Divisia and Laspeyres. As uncertainty plays a vital role in this approach, the foundations differ markedly from those of the functional approach; linking the index number theory to regression analysis we not only get an estimate of the rate of inflation but also its sampling variance. With the relaxation of the assumption that prices of goods and services change equiproportionately, individual prices in the basket of price index move disproportionately (which usually happens) and thus the overall rate of inflation may become less well defined [Selvanathan and Selvanathan (2006b)]. In such situations the ability of the stochastic approach becomes important as it allows us to construct confidence interval around the estimated rate of inflation with the help of standard error (of inflation). Confidence interval can be used for some practical purposes such as wage negotiations, wage indexation, inflation targeting (in interval), etc.

[2] This 'underlying' rate of inflation need not be confused with (a completely different) concept of 'core inflation' being used by some central banks to see long-term trend in change in general price level (sans temporary, short term, non-monetary, and supply side related changes in inflation). Core inflation is altogether a different measure of change in prices of a shrunk set of commodities which are more linked with demand side compared to supply side (exclusion based measures like non-food non energy inflation rate) or trimmed set of commodities prices of which are not highly volatile (like 20 percent trimming—those commodities which show extreme price changes—based measures of inflation).

One of the criticisms on this new stochastic approach of Clements and Izan (1987) is on the restriction of homoscedasticity on the variance of the error term in the OLS regression [Diewert (1995)]. Crompton (2000) also pointed out this deficiency and extended the new stochastic approach to derive robust standard errors for the rate of inflation by relaxing the earlier restriction on the variance of the error term by considering an unknown form of heteroscedasticity. Selvanathan (2003) presented some comments and corrections on Crompton's work. Selvanathan and Selvanathan (2004) showed how recent developments in the stochastic approach to index number can be used to model commodity prices in OECD countries. Selvanathan and Selvanathan (2006) calculated the annual rate of inflation for Australia, UK and US using the stochastic approach.[3] These studies provided a mechanism for calculating the standard error for inflation. Rather than targeting the headline (year on year or YoY) inflation, some countries track 12 month moving average inflation as the goal of monetary policy. However, there is no work in the literature to estimate the standard error of period average inflation. We contribute by developing a mechanism to estimate the standard error of period average inflation.[4]

In this study we estimate standard errors of month on month (MoM) and YoY inflation in Pakistan using the stochastic approach, following Selvanathan and Selvanathan (2006). Since the State Bank of Pakistan (the central bank) targets 12-month average of YoY inflation, we contribute by applying our mechanism to estimate the standard error of 12-month average inflation in Pakistan.

The criticism on the assumption that when prices change they change equally proportionally, has been responded to by Clements and Izan (1987) who extend the stochastic approach by considering the underlying rate of inflation separate from the changes in relative prices. We also estimate the standard errors of (MoM, and YoY) inflation in Pakistan using the same approach. We contribute by developing a mechanism, and applying this to Pakistan, to estimate the standard error of period average inflation also using the same approach. Furthermore, by applying this approach we also estimate the systematic (MoM, and YoY, and 12-month average) change in relative prices based upon individual prices of 374 commodities in the CPI basket of Pakistan for the period July 2001-June 2010. However, in this paper we present only the average systematic change in relative prices of different groups in the CPI basket.

In the following section we provide the details of the existing mechanisms of stochastic approach and their applications in the index number theory in the context of price index. We then further build upon this approach to estimate YoY inflation, period (12-month) average inflation and their standard errors. In section 3 we present the results of the application of the stochastic and the extended stochastic approach for estimating MoM inflation, YoY inflation, and period (12-month) average inflation along with their standard errors. In section 4 we present the estimated average systematic change in relative prices of different groups in the CPI basket of Pakistan. Concluding remarks follow in the last Section.

[3]Clements, Izan and Selvanathan (2006) presented a review on the stochastic approach to index number theory.

[4]As mentioned earlier, we have not estimated the standard error of the core inflation rate measures like those exclusion-based or trimming-based. However, our working on the 12 month average inflation rate may be viewed as an exercise on the core inflation (because 12 month average inflation rate can be used as core inflation measure because it smoothes out fluctuations).

2. UNFOLDING THE STOCHASTIC APPROACH TO INDEX NUMBERS

The different ways to apply the stochastic approach to index numbers give various forms of index numbers like Divisia, Laspeyres etc. Since the Federal Bureau of Statistics (Pakistan's official statistical agency) uses Laspeyres index formula for measuring inflation in period t over the base period, we would like to confine the following analysis to derive the Laspeyres index.

2.1. Derivation of Laspeyres Index Number[5]

Following conventional notations let p represents price and q represent the quantity. We subscript these notations by it where $i(i = 1, 2, \dots, n)$ represents commodity and $t(t = 1, 2, \dots\dots, T)$ the time (which is month, in this study). Under stochastic approach any observed price change is a reading on the 'underlying' rate of inflation and a random component ($\in_{it}$). If γ_t is the price index, relating expenditures in period t to expenditures in the base period, then following the stochastic approach we can write

$$p_{it}q_{i0} = \gamma_t\, p_{i0}q_{i0} + \in_{it} \qquad t(t = 1, 2, \dots\dots, T) \qquad \dots \quad \dots \quad \dots \quad (1)$$

We assume

$$E(\in_{it}) = 0 \ , Cov(\in_{it}, \in_{jt}) = \sigma_t{}^2 p_{i0}q_{i0}\delta_{ij} \qquad (\delta_{ij} \text{ is the Kronecker delta}) \qquad (2)$$

In this way the index number theory has been related to regression analysis as now we can estimate the rate of inflation in period t by estimating the unknown parameter γ_t in (1). Rearranging (1) we get

$$\frac{P_{it}}{P_{i0}} = \gamma_t + \frac{\epsilon_{it}}{p_{i0}q_{i0}} \qquad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$
$$\Rightarrow E\left(\frac{P_{it}}{P_{i0}}\right) = \gamma_t,$$

To remove heteroscedasticity in the error term we transform equation (1) into new form which gives homoscedastic variances in the error term across all the n commodities in any particular time period t. For this purpose we divide Equation (1) by $\sqrt{p_{i0}\, q_{i0}}$ and obtain

$$y_{it} = \gamma_t x_{i0} + \eta_{it} \qquad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (4)$$

Where $y_{it} = \frac{P_{it}\, q_{i0}}{\sqrt{P_{i0}\, q_{i0}}}$; $\qquad x_{i0} = \sqrt{p_{i0}\, q_{i0}}$ and $\eta_{it} = \frac{\epsilon_{it}}{\sqrt{P_{i0}\, q_{i0}}}$

Now assumptions in (2) after above transformation are

$$E(\eta_{it}) = 0 \ and \ Cov(\eta_{it}, \eta_{jt}) = \sigma_t{}^2 \ \delta_{ij}$$

Now we can apply, say, the least squares to (4) to have an estimator for inflation as below:

$$\hat{\gamma}_t = \frac{\sum_{i=1}^{n} x_{i0}y_{it}}{\sum_{i=1}^{n} x_{i0}{}^2}$$

[5]This sub-section (2.1) is mostly based upon Selvanathan and Selvanathan (2006b).

$$= \frac{\sum_{i=1}^{n}(\sqrt{p_{i0}\,q_{i0}})(\frac{p_{it}\,q_{i0}}{\sqrt{p_{i0}\,q_{i0}}})}{\sum_{i=1}^{n} p_{i0}\,q_{i0}} = \frac{\sum_{i=1}^{n} p_{it}\,q_{i0}}{\sum_{i=1}^{n} p_{i0}\,q_{i0}} = \frac{\sum_{i=1}^{n}(\frac{p_{it}\,q_{i0}}{p_{i0}})p_{i0}}{\sum_{i=1}^{n} p_{i0}\,q_{i0}} = \sum_{i=1}^{n}[\frac{p_{it}}{p_{i0}} \times \frac{p_{i0}\,q_{i0}}{\sum_{i=1}^{n} p_{i0}\,q_{i0}}]$$

We know $\frac{p_{i0}\,q_{i0}}{\sum_{i=1}^{n} p_{i0}\,q_{i0}}$ is the budget share of commodity i in the base period and if we write it as

$w_{i0} = \frac{p_{i0}\,q_{i0}}{\sum_{i=1}^{n} p_{i0}\,q_{i0}}$ where $\sum_{i=1}^{n} w_{i0} = 1$, we have

$$\hat{\gamma}_t = \sum_{i=1}^{n} w_{i0}\,\frac{p_{it}}{p_{i0}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (5)$$

Which is weighted average of the *n* price ratios (with base-period budget shares being weights) and is the well-known Laspeyres price index. With the help of this price index we can have inflation (MoM and/or YoY) by using simple formulae as below:

$$Inflation\ (MoM) = (\frac{\hat{\gamma}_t}{\hat{\gamma}_{t-1}} - 1) \times 100 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (6)$$

$$Inflation\ (YoY) = (\frac{\hat{\gamma}_t}{\hat{\gamma}_{t-12}} - 1) \times 100 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (7)$$

Variance of the estimator in (5) is given by

$$Var(\hat{\gamma}_t) = \frac{\sigma_t^2}{\sum_{i=1}^{n} x_{i0}^2} \quad \ldots \quad \ldots. \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (8)$$

The parameter σ_t^2 can be estimated as

$$\hat{\sigma}_t^2 = \frac{1}{n-1}\sum_{i=1}^{n}(y_{it} - \hat{\gamma}_t x_{i0})^2 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (9)$$

By substitution the estimated parameter of σ_t^2 from (9) together with the values of x_{i0} and y_{it} in (8) and rearranging we get

$$Var(\hat{\gamma}_t) = \frac{1}{n-1}\sum_{i=1}^{n} w_{i0}(^{p_{it}}/_{p_{i0}} - \hat{\gamma}_t)^2 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (10)$$

Thus, as the degree of relative price variability increases, the variance of the estimated index also increases. This agrees with the intuitive notion that when the individual prices move very disproportionately, the overall price index is less well-defined [Logue and Willet (1976)].

Now the question is can we have the estimated price index in (5) and (10) and its estimated variance respectively. From (5) we can find the estimated rate of inflation but here we cannot find the variance of the estimated rate of inflation. For this purpose we have to proceed with inflation from the start rather than the index.

2.2. Application of Stochastic Approach to Estimate Headline Inflation and Its S.E.

Following the notations used above, if γ_t is the price index, relating expenditures in the current period to expenditures in the base period, then, following the stochastic approach, we can write

$$p_{it}q_{i0} = \gamma_t\, p_{i0}q_{i0} + \epsilon_{it} \qquad t(t = 1, 2, \ldots\ldots, T) \quad \ldots \quad \ldots \quad \ldots \quad (11)$$

The base period can be somewhere in the distant past (say five year back) and at any point in time we define headline (or, YoY) inflation as percentage change in price index over the corresponding month last year then

$$\pi_t^H = \frac{\gamma_t - \gamma_{t-12}}{\gamma_{t-12}}$$

From (11) we can get estimate of γ_t only. For estimate of γ_{t-12} we write (11) as

$$p_{it-12}q_{i0} = \gamma_{t-12}\, p_{i0}q_{i0} + \in_{it-12} \qquad t(t = 13,14,15 \ldots\ldots, T) \qquad \ldots \quad (12)$$

Here again $E\left(\frac{P_{it-12}}{P_{i0}}\right) = \gamma_{t-12}$, under similar assumptions as in (2)

By subtracting (12) from (11) we have

$$p_{it}q_{i0} - p_{it-12}q_{i0} = (\gamma_t - \gamma_{t-12})p_{i0}q_{i0} + \epsilon_{it} - \epsilon_{it-12} \qquad \ldots \quad \ldots \quad (13)$$

Dividing (13) by $E(\frac{p_{it-12}}{p_{i0}})$ and substituting $E\left(\frac{P_{it-12}}{P_{i0}}\right) = \gamma_{t-12}$ on right hand side, we get

$$\left[\frac{p_{it}q_{i0} - p_{it-12}q_{i0}}{E\left(\frac{p_{it-12}}{p_{i0}}\right)}\right] = (\frac{\gamma_t - \gamma_{t-12}}{\gamma_{t-12}})p_{i0}q_{i0} + \frac{\epsilon_{it} - \epsilon_{it-12}}{\gamma_{t-12}} = \pi_t^H p_{i0}q_{i0} + e_{it} \qquad \ldots \quad (14)$$

Where $e_{it} = \frac{\epsilon_{it} - \epsilon_{it-12}}{\gamma_{t-12}}$. Again assuming that

$$E(e_{it}) = 0 \text{ and } Cov(e_{it}, e_{jt}) = \rho_t^2 p_{i0}q_{i0}\delta_{ij} \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (15)$$

and proceeding as in subsection 2.1 we divide (14) by $\sqrt{p_{i0}q_{i0}}$ and get

$$\left[\frac{\frac{p_{it}}{p_{i0}} - \frac{p_{it-12}}{p_{i0}}}{E\left(\frac{p_{it-12}}{p_{i0}}\right)}\right]\sqrt{p_{i0}q_{i0}} = \pi_t^H\sqrt{p_{i0}q_{i0}} + \frac{e_{it}}{\sqrt{p_{i0}q_{i0}}} \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (16)$$

From (5) and (12) we can write $\gamma_{t-12} = E\left(\frac{p_{it-12}}{p_{i0}}\right) = \sum_{i=1}^n w_{i0}\frac{p_{it-12}}{p_{i0}}$, Thus (16) becomes

$$\left[\frac{\frac{p_{it}}{p_{i0}} - \frac{p_{it-12}}{p_{i0}}}{\sum_{i=1}^n w_{i0}\frac{p_{it-12}}{p_{i0}}}\right]\sqrt{p_{i0}q_{i0}} = \pi_t^H\sqrt{p_{i0}q_{i0}} + \frac{e_{it}}{\sqrt{p_{i0}q_{i0}}}$$

If we take $Y_{it} = \left(\frac{\frac{p_{it}}{p_{i0}} - \frac{p_{it-12}}{p_{i0}}}{\sum_{i=1}^n w_{i0}\frac{p_{it-12}}{p_{i0}}}\right)\sqrt{p_{i0}q_{i0}}$, $X_{i0} = \sqrt{p_{i0}q_{i0}}$ and $\varphi_{it} = \frac{e_{it}}{\sqrt{p_{i0}q_{i0}}}$. Under assumptions that $E(\varphi_{it})$=0 and $Cov(\varphi_{it,}\varphi_{jt}) = \varrho_t^2\delta_{ij}$, for equation

$$Y_{it} = \pi_t^H X_{io} + \varphi_{it} \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (17)$$

Least square estimator of π_t^H is

$$\hat{\pi}_t^H = \frac{\sum_{i=1}^n X_{i0}Y_{it}}{\sum_{i=1}^n X_{i0}^2} = \frac{\sum_{i=1}^n \sqrt{p_{i0}q_{i0}}\left[\frac{\frac{p_{it}}{p_{i0}} - \frac{p_{it-12}}{p_{i0}}}{\sum_{i=1}^n w_{i0}\frac{p_{it-12}}{p_{i0}}}\right]\sqrt{p_{i0}q_{i0}}}{\sum_{i=1}^n p_{i0}q_{i0}}$$

$$= \sum_{i=1}^n w_{i0}\left[\frac{\frac{p_{it}}{p_{i0}} - \frac{p_{it-12}}{p_{i0}}}{\sum_{i=1}^n w_{i0}\frac{p_{it-12}}{p_{i0}}}\right] = \frac{\hat{Y}_t - \hat{Y}_{t-12}}{\hat{Y}_{t-12}} \qquad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (18)$$

We knew this result from (7). The only benefit of the above process is that now we can have an estimate of the standard error of headline inflation as below:

$$Var\,(\hat{\pi}_t^H) = \frac{\varrho_t^2}{\sum_{i=1}^n X_{i0}^2} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (19)$$

The parameter ϱ_t^2 can be estimated as

$$\hat{\varrho}_t^2 = \frac{1}{n-1}\sum_{i=1}^n (Y_{it} - \hat{\pi}_t^H X_{i0})^2$$

By substitution of the estimated parameter ϱ_t^2 in (19) and rearranging we get

$$Var\,(\hat{\pi}_t^H) = \frac{1}{n-1}\sum_{i=1}^n w_{i0}\left[\frac{\frac{p_{it}}{p_{i0}} - \frac{p_{it-12}}{p_{i0}}}{\sum_{i=1}^n w_{i0}\frac{p_{it-12}}{p_{i0}}} - \hat{\pi}_t^H\right]^2 \quad \ldots \quad \ldots \quad \ldots \quad (20)$$

Equation (20) shows that the variance of $\hat{\pi}_t^H$ increases with the degree of relative inflation variability.[6] Now we move towards estimating the period average inflation and its standard error.

2.3. Application of Stochastic Approach to Estimate Period Average Inflation and Its S.E.

We know that period average (say 12 month average) inflation can be calculated either by averaging the last 12 YoY inflation numbers or by taking YoY inflation of the last 12-month (moving) averaged index number. We would like to use the above result in subsection 2.1 for estimating the 12-month average inflation, and those in subsection 2.2 for the standard error of period average inflation.

We have price index series as p_{it}. If the 12-month averaged price index series is denoted by p_{it}^A then following the results in subsection 2.1, the estimate of YoY inflation of p_{it}^A series will be

$$\hat{Y}_t^A = \sum_{i=1}^n w_{i0}\frac{p_{it}^A}{p_{i0}} \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (21)$$

And thus

$$\hat{\pi}_t^A = \left(\frac{\hat{Y}_t^A}{\hat{Y}_{t-12}^A} - 1\right) * 100 \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots \quad (22)$$

Now for estimating the variance of the average inflation we use the result in subsection 2.2 where we derived the standard error of YoY inflation. If we replace the index with the average index in (20) we will get the standard error of average YoY inflation, that is

$$Var\,(\hat{\pi}_t^A) = \frac{1}{n-1}\sum_{i=1}^n w_{i0}\left[\frac{\frac{p_{it}^A}{p_{i0}} - \frac{p_{it-12}^A}{p_{i0}}}{\sum_{i=1}^n w_{i0}\frac{p_{it-12}^A}{p_{i0}}} - \hat{\pi}_t^A\right]^2 \quad \ldots \quad \ldots \quad \ldots \quad (23)$$

3. MEASURING STANDARD ERRORS OF INFLATION IN PAKISTAN

In this section we present an application of the results described and derived in the previous section by using the monthly data of prices of 374 commodities covering the

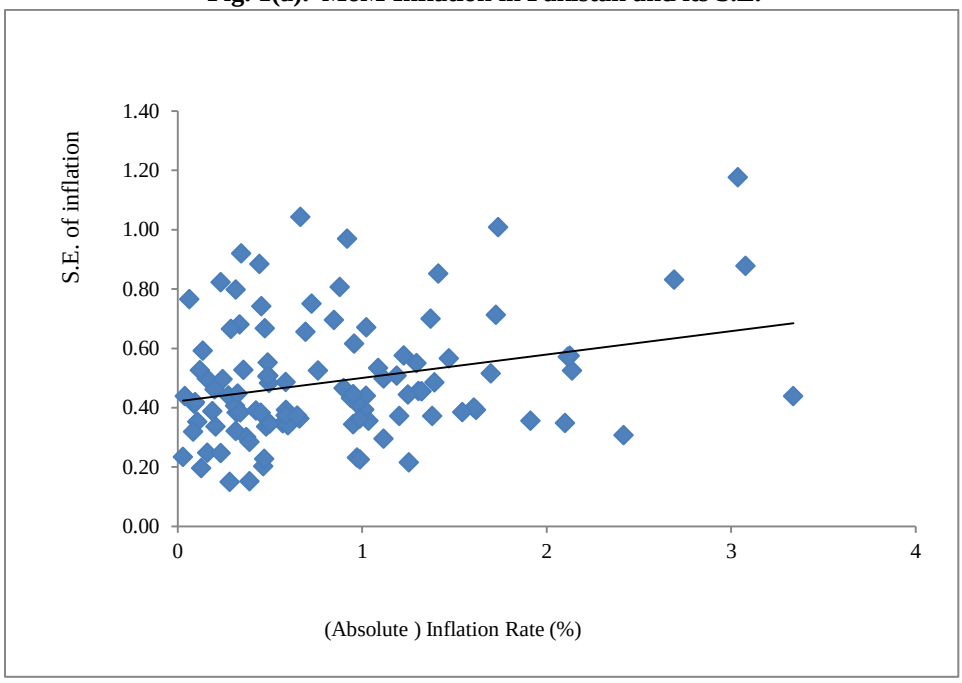
[6]Above procedure can be used to estimate the MoM inflation and its standard error.

period July 2001–June 2010 for Pakistan.[7] We present the estimated MoM inflation, YoY inflation, along with their standard errors for Pakistan. As discussed above, there are different ways to apply the stochastic approach to index numbers and each culminates in different form of index numbers like Divisia, Laspeyres etc. Just to compare our estimated results of inflation with those from the Federal Bureau of Statistics we have used such application of the stochastic approach which produces Laspeyres index formula for measuring inflation in the current period over the base period. Since the State Bank of Pakistan targets (12-month) average inflation, particular attention has been paid to estimate period (12-month) average inflation rate and its standard error, which is the first empirical application of its type.

Table A1 in the Appendix presents the official rate of (monthly, YoY and 12-month average) inflation and the estimated rate of (monthly, YoY and 12-month average) inflation based on the stochastic approach along with standard error of the estimate of inflation for Pakistan economy based on the data for July 2001 to June 2010.[8]

Figures 1(a) to 1(c) present a scatter plot of inflation versus the corresponding standard error for MoM, YoY and 12-month average inflation; the solid line is the linear trend line.

Fig. 1(a). MoM Inflation in Pakistan and its S.E.



[7]Prices, for construction of consumer price index (CPI), are collected by Pakistan Bureau of Statistics (the central statistical agency of the Government of Pakistan) on monthly basis. In August 2011, while changing the base year for CPI from FY 2001 to FY 2008, PBS also expanded the coverage of goods/services in the CPI basket by increasing the number of commodities from 374 to 487. In this study, we have used the previous base (FY 2001) dataset.

[8]First 12 observations are lost in the YoY inflation calculation and next 12 are consumed in calculating the 12 month average. Thus, the results in the Table 1 start from July 2003 instead of July 2001.

Fig. 1(b). YoY infaltion in Paksitan and its S.E.

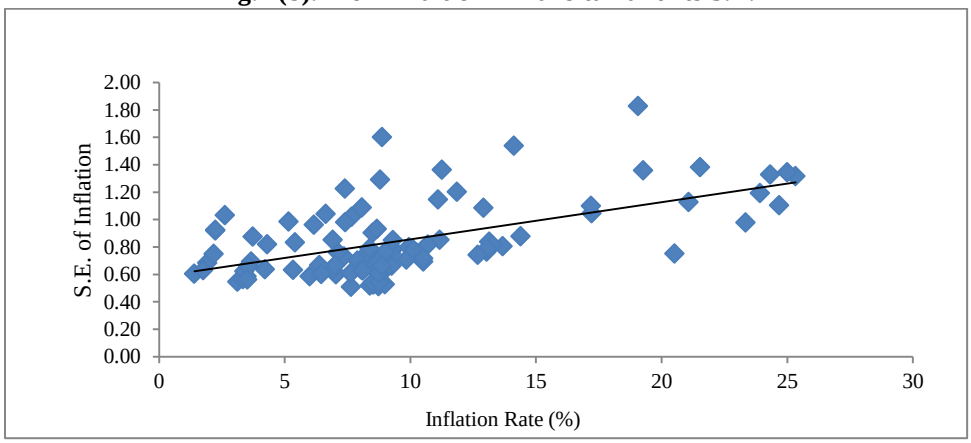
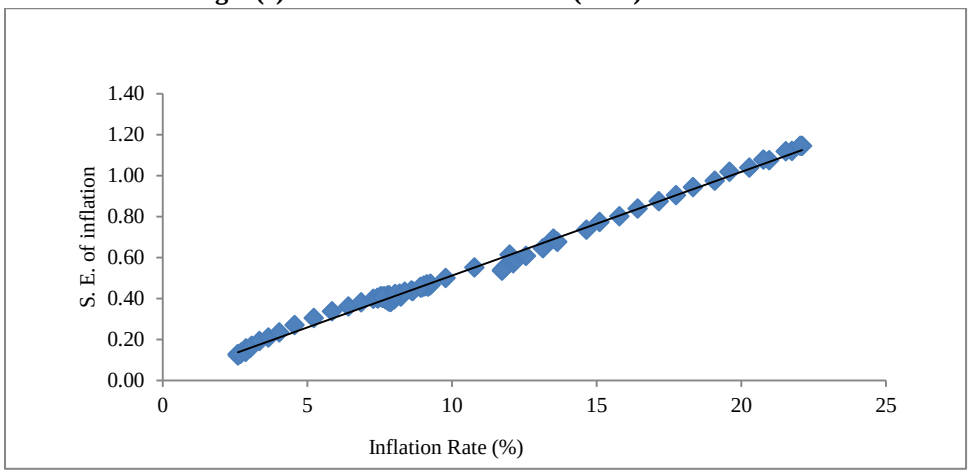


Fig. 1(c). 12 month MA inflation (YoY) and its S.E.



From Figures 1(a) to 1(c) we can see that the standard error increases with increasing inflation as depicted by the positive slope of the trend line. This can be interpreted to mean that when inflation is higher it becomes difficult to predict it. This agrees with the intuitive notion that when the individual prices move very disproportionately, the overall rate of inflation is less well defined. These observations are in line with the past literature on the rate and variability of inflation.[9] Figures 1(b) and 1(c) also answer the question, "Why some central banks pursue (target) 12-month moving average (YoY) inflation rate rather than monthly headline (YoY) rate of inflation?" Some central banks use the 12-month average as the core inflation. The answer is simple: the average (YoY) inflation is less volatile than the headline inflation. This is evident from the lower S.E. of 12-month moving average (YoY) inflation as shown in the figure 1(c) and compared to S.E. of monthly headline (YoY) inflation presented in 1(b).

[9]The inflation may become less predictable at higher inflation rate if government aims stabilising prices rather than stabilising expectations [Logue and Willet (1976)].

Fig. 2(a). MoM Inflation in Pakistan and 95 percent Confidence Band

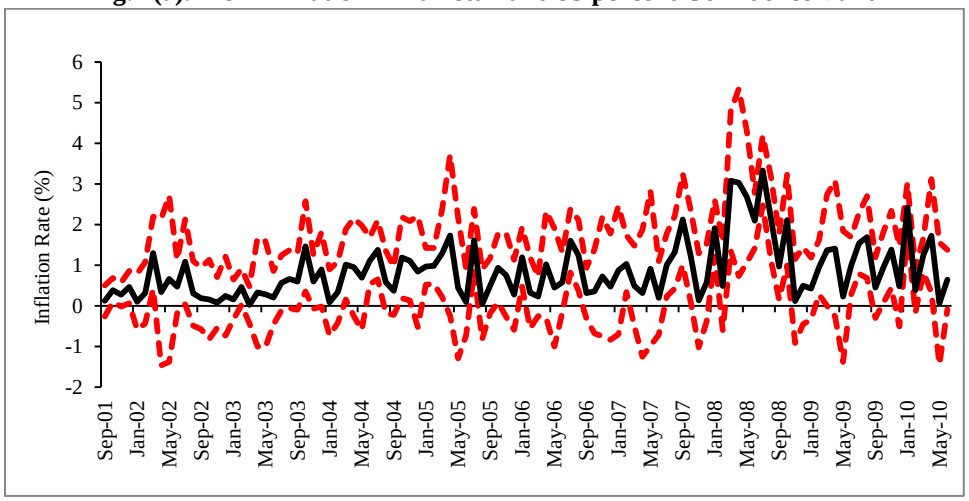


Fig. 2(b): YoY Inflation in Pakistan and 95 percent Confidence Band

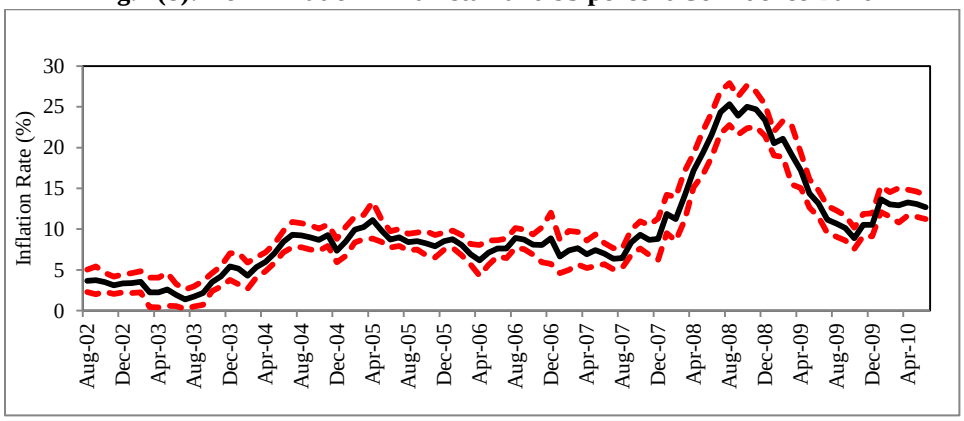


Fig. 2(c). 12 month MA Inflation (YoY) in Pakistan and 95 percent Confidence Band

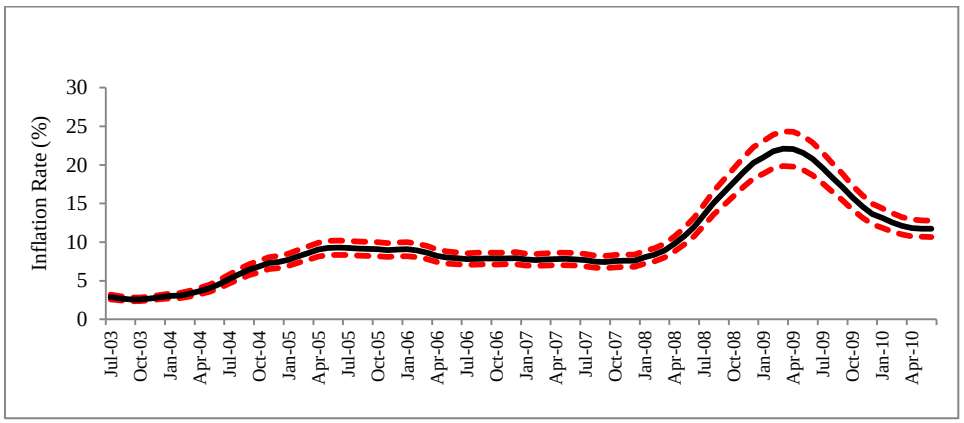


Figure 2 (a) to Figure 2(c) present the graph of all the three types of inflation along with the respective 95 percent confidence band. From Figure 2 (a) it is clear that the time when there is a jump in inflation, as in April 2005 and May 2008, there is an increase in the width of the confidence bands. Similarly we can note that in other figures where the inflation is high, the width of confidence band is also increased.

4. EXTENDED STOCHASTIC APPROACH AND THE SYSTEMATIC CHANGE IN RELATIVE PRICES

As we discussed in Section 2, the various applications of the stochastic approach to index numbers yield different forms of index numbers like the Laspeyres etc. However, as criticised by Keynes (1930), following this approach it is assumed that when prices change they change equiproportionately and thus relative prices remain the same. Clements and Izan (1987) responded to Keynes' criticism by considering common trend change in all prices underlying the rate of inflation separate from the systematic change in relative prices. Following Clements and Izan (1987), if we take p_{it} as the price of commodity i $(i = 1, 2, \dots, n)$ at time $t(t = 1, 2, \dots\dots, T)$ then price log change $Dp_{it} = \log p_{it} - \log p_{it-1}$ can be considered as

$$Dp_{it} = \alpha_t + \beta_i + \xi_{it} \quad i = 1, 2, \dots, n; \text{ and } t = 1, 2, \dots\dots, T \quad \dots \quad \dots \quad (24)$$

Where α_t is the common trend change in all prices (the underlying rate of inflation) and β_i is the change in relative prices of commodity i. Assuming the random component of change in prices, ξ_{it}, to be independent over commodities and time, and the variances $[Var(\xi_{it})]$ inversely proportional to corresponding arithmetic averages of budget shares, Clements and Izan (1987) showed that the least squares estimates of α_t and β_i are subject to budget constraint[10] as given below:

$$\hat{\alpha}_t = \sum_{i=1}^{n} \overline{w}_i \, Dp_{it} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (25)$$

$$\hat{\beta}_i = \frac{1}{T}\sum_{t=1}^{T}\left[\frac{1}{\theta_t^2} \Big/ \sum_{t=1}^{T}\frac{1}{\theta_t^2}\right]\left(Dp_{it} - \hat{\alpha}_t\right) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (26)$$

With respective variances of these estimators as below:

$$Var(\hat{\alpha}_t) = \frac{\theta_t^2}{(n-1)} \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (27)$$

$$Var\left(\hat{\beta}_i\right) = \frac{1}{(n-1)\sum_{t=1}^{T}\frac{1}{\theta_t^2}}\left(\frac{1}{\overline{w}_i} - 1\right) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (28)$$

Where θ_t^2 is the sum (over commodities) of squares of estimated random component of price changes, that is

$$\theta_t^2 = \sum_{i=1}^{n}\left(\hat{\xi}_{it}\right)^2 = \sum_{i=1}^{n}\overline{w}_i(Dp_{it} - \hat{\alpha}_t)^2 + \sum_{i=1}^{n}\overline{w}_i(\overline{Dp_i} - \bar{\hat{\alpha}})^2$$
$$-2\sum_{i=1}^{n}\overline{w}_i(Dp_{it} - \hat{\alpha}_t)\,\overline{w}_i(\overline{Dp_i} - \bar{\hat{\alpha}}) \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (29)$$

While it is obvious that $\overline{Dp_i} = \frac{1}{T}\sum_{t=1}^{T} Dp_{it}$ and $\bar{\hat{\alpha}} = \frac{1}{T}\sum_{t=1}^{T}\hat{\alpha}_t$

[10]Budget share weighted average of the systematic component of relative price change is zero.

Our contribution in this section of the study is the application of the Clements and Izan (1987) extended stochastic approach to index numbers to Pakistan's monthly data of prices of 374 commodities covering the period July 2001–June 2010. The extended stochastic approach to index number is closer to Divisia price index. As in the above Section 3, this approach also gives us the (trend) inflation rate and its standard errors which are presented in Table A1 of the Appendix. We can see that the estimated standard errors of the inflation rate based upon extended stochastic approach to inflation are lower than those based upon the stochastic approach for the MoM and YoY inflation. It needs not be true in the case of period average inflation (because of averaging effects).

In addition to inflation and its standard error, the Clements and Izan (1987) extended stochastic approach also gives us the systematic change in relative prices of each commodity in the basket. We have applied this approach to prices of 374 commodities in the CPI basket of Pakistan for the period of FY01 to FY 2010 to investigate the systematic relative price changes. It may be difficult to extract any meaningful result from the detailed presentation of systematic (MoM, and YoY, and 12-month average) change in relative prices of each of the 374 commodities.[11] However, it will be useful if we present the systematic (MoM, and YoY, and 12-month average) change in relative prices for various groups in the CPI basket as in Table A2 of the Appendix. There are ten groups in the CPI basket of Pakistan as shown in Table A2. It is clear from the table that coefficients of relative prices of all groups are significantly different from zero. For comparison we have also given the observed relative price changes as measured from FBS price data for all the three cases: MoM, YoY and 12-month moving average.[12]

The estimated relative prices of 'Food Beverages & Tobacco' group are increased by highest percentage point for MoM changes (0.18 percent). In case of YoY changes, we find 'Food Beverages and Tobacco (FBT)' and 'Fuel and Lighting' groups to exhibit increase in relative prices by 1.72 percent and 0.37 percent respectively. In the case of 12-month moving averages, we find 'FBT' and 'House Rent' groups to depict increase in relative prices by 1.72 percent and 0.04 percent respectively. In all the three cases, since the 'FBT' group turned out to have the highest change in relative prices, we can say that inflation during most of the FY01 to FY10 was FBT price change driven.

Interestingly, for each of the three cases of MoM, YoY and 12-month moving average, the change in relative prices is found to be highest (positive) for 'FBT' group and lowest (negative) for 'Recreation and Entertainment (RE)' group during FY01 to FY10. The supply side factor(s) and/or elasticities of demand may be behind this observed phenomenon as commodities in the FBT group are more prone to supply shocks and tend to be less price elastic compared to those in RE group.

Table A1 in the Appendix presents the official rate of (monthly, YoY and 12-month average) inflation and the estimated rate of (monthly, YoY and 12-month average) inflation based on stochastic as well as extended stochastic approaches along with standard error of the estimates of inflation for Pakistan based on the data for July 2001 to June 2010. Numerically, the official and estimated inflation rates seem different. But when we apply t-test we could not find official inflation rate to be statistically different from any of the estimated inflation rates based on stochastic as well as extended

[11]Detailed results can be obtained from the authors, if desired.

[12]We can see from the Table A2 in the Appendix that the weighted average of the relative prices is zero in each of the observed and estimated case, which should be.

stochastic approaches.[13] Which approach for measuring inflation is better? Obviously the stochastic approach has an advantage as it estimates the standard errors along with the inflation rate and is therefore preferable. Furthermore, in the case of using extended stochastic approach we also get estimates of systematic change in relative prices and their standard errors. The confidence interval can be built around the estimated rate of inflation for different useful purposes like wage bargaining.

5. CONCLUSION

In this study we estimate the standard errors of month on month and year on year inflation rate using the stochastic approach of Selvanathan and Selvanathan (2006) and the extended stochastic approach of Clements and Izan (1987) based on individual prices of 374 commodities in CPI basket of Pakistan for the period July 2001 to June 2010. We also contribute to the literature by employing the stochastic approach to index numbers by developing a mechanism to estimate the inflation rate and its standard error for period average CPI. Based on this mechanism, we estimate the standard error of 12-month moving average YoY inflation rate for Pakistan for the period July 2003 to June 2010. We find that the standard error of inflation increases with inflation rate in Pakistan. Notwithstanding the fact that the 'higher the standard error the higher the inflation rate', the estimated standard errors of inflation rate based on extended stochastic approach are lower than those based on the stochastic approach. Furthermore, for each of the three cases of MoM, YoY and 12-month average, the change in relative prices is found to be highest for 'Food Beverages and Tobacco' group and lowest for 'Recreation and Entertainment' group during FY01 to FY10.

APPENDIX

Table A1

Official Inflation Rate, Stochastic (Extended Stochastic) Approach Related Estimates of Inflation and Respective Standard Errors

	Month on Month					Headline (Year on Year)					12-month moving average				
	Official Inflation Rate	Stochastic Approach Estimates of		Extended Stochastic Approach Estimates of		Official Rate of Inflation	Stochastic Approach Estimates of		Extended Stochastic Approach Estimates of		Official Rate of Inflation	Stochastic Approach Estimate of		Extended Stochastic Approach Estimates of	
Month		inflation	S.E.	Inflation	S.E.		Inflation	S.E.	Inflation	S.E.		Inflation	S.E.	Inflation	S.E.
Jul-03	0.57	1.01	0.35	0.89	0.24	1.41	1.72	0.60	1.80	0.54	2.89	3.03	0.16	1.54	0.48
Aug-03	0.66	0.76	0.36	0.62	0.15	1.76	2.03	0.63	2.04	0.52	2.73	2.68	0.14	1.52	0.48
Sep-03	0.60	0.53	0.35	0.32	0.18	2.18	2.34	0.75	2.21	0.54	2.60	2.50	0.13	1.50	0.50
Oct-03	1.47	1.57	0.57	1.20	0.33	3.51	4.94	0.56	3.47	0.50	2.60	2.37	0.12	1.64	0.50
Nov-03	0.60	0.69	0.34	0.74	0.14	4.22	5.08	0.64	4.29	0.57	2.70	2.52	0.13	1.89	0.49
Dec-03	0.90	1.17	0.47	1.12	0.17	5.41	6.92	0.83	5.43	0.56	2.87	2.68	0.14	2.22	0.46
Jan-04	-0.09	0.11	0.41	-0.07	0.27	5.15	6.67	0.98	5.26	0.58	3.02	3.06	0.16	2.54	0.42
Feb-04	-0.34	-0.48	0.38	-0.23	0.31	4.31	5.43	0.82	4.62	0.59	3.09	3.29	0.17	2.79	0.40
Mar-04	1.02	0.81	0.44	0.74	0.26	5.34	6.19	0.63	5.52	0.51	3.35	3.73	0.19	3.21	0.38
Apr-04	0.96	0.81	0.62	0.42	0.35	5.99	6.39	0.59	6.02	0.48	3.66	4.07	0.21	3.56	0.37
May-04	0.69	0.78	0.65	1.02	0.43	7.04	7.57	0.60	7.03	0.50	4.03	4.56	0.23	4.08	0.36
Jun-04	1.12	1.00	0.29	1.12	0.20	8.45	9.10	0.67	7.89	0.53	4.57	5.26	0.27	4.70	0.36
Jul-04	1.38	1.58	0.37	1.20	0.25	9.33	9.72	0.78	8.21	0.56	5.23	5.94	0.30	5.23	0.36
Aug-04	0.59	0.64	0.39	0.62	0.14	9.25	9.59	0.75	8.20	0.52	5.86	6.58	0.34	5.75	0.37
Sep-04	0.37	0.27	0.30	0.28	0.12	9.00	9.30	0.76	8.16	0.55	6.43	7.03	0.36	6.27	0.40
Oct-04	1.19	1.19	0.51	0.76	0.14	8.70	8.89	0.69	7.72	0.49	6.86	7.41	0.38	6.62	0.41
Nov-04	1.12	0.99	0.50	1.05	0.21	9.26	9.22	0.66	8.04	0.51	7.29	7.77	0.40	6.94	0.42

Continued—

[13]The results of t-test are not reported in the paper to save the space. However, those can be obtained from the authors, if required.

Table A1—(*Continued*)

	Month on Month					Headline (Year on Year)					12-month moving average				
	Official Inflation Rate	Stochastic Approach Estimates of		Extended Stochastic Approach Estimates of		Official Rate of Inflation	Stochastic Approach Estimates of		Extended Stochastic Approach Estimates of		Official Rate of Inflation	Stochastic Approach Estimate of		Extended Stochastic Approach Estimates of	
Month		inflation	S.E.	Inflation	S.E.		Inflation	S.E.	Inflation	S.E.		Inflation	S.E.	Inflation	S.E.
Dec-04	-0.85	-0.97	0.70	-0.05	0.38	7.37	6.91	0.73	6.87	0.54	7.45	7.79	0.40	7.03	0.40
Jan-05	0.97	1.04	0.23	0.95	0.19	8.51	7.89	0.90	7.88	0.63	7.72	7.90	0.40	7.21	0.38
Feb-05	0.99	1.03	0.22	0.83	0.17	9.95	9.53	0.80	8.95	0.66	8.19	8.23	0.42	7.54	0.39
Mar-05	1.29	1.56	0.55	0.84	0.27	10.25	10.35	0.76	9.05	0.60	8.60	8.56	0.44	7.81	0.40
Apr-05	1.74	2.10	1.01	0.94	0.41	11.10	11.76	1.15	9.56	0.61	9.03	9.00	0.46	8.11	0.40
May-05	-0.44	-0.84	0.88	0.16	0.31	9.84	9.96	0.71	8.70	0.51	9.26	9.18	0.47	8.22	0.39
Jun-05	0.10	-0.28	0.42	0.74	0.19	8.74	8.57	0.51	8.32	0.46	9.28	9.13	0.47	8.27	0.39
Jul-05	1.62	1.55	0.39	1.06	0.18	8.99	8.54	0.53	8.17	0.48	9.25	9.04	0.46	8.28	0.38
Aug-05	0.04	0.12	0.44	0.12	0.23	8.40	7.98	0.52	7.67	0.46	9.17	8.90	0.46	8.24	0.37
Sep-05	0.50	0.44	0.35	0.34	0.15	8.53	8.17	0.53	7.73	0.48	9.13	9.12	0.47	8.21	0.36
Oct-05	0.94	0.53	0.43	0.51	0.16	8.27	7.46	0.75	7.48	0.55	9.09	9.01	0.46	8.18	0.37
Nov-05	0.76	0.94	0.53	0.93	0.18	7.89	7.41	0.70	7.36	0.54	8.97	8.84	0.45	8.08	0.38
Dec-05	-0.27	-0.33	0.44	-0.10	0.23	8.51	8.10	0.54	7.30	0.45	9.06	8.93	0.46	8.11	0.38
Jan-06	1.20	1.28	0.37	0.96	0.31	8.76	8.37	0.54	7.32	0.40	9.08	8.96	0.46	8.06	0.39
Feb-06	0.33	0.42	0.45	0.69	0.32	8.05	7.71	0.63	7.17	0.48	8.92	8.81	0.45	7.93	0.40
Mar-06	0.23	0.25	0.25	0.16	0.17	6.91	6.32	0.64	6.49	0.51	8.64	8.50	0.44	7.73	0.41
Apr-06	1.02	1.09	0.67	0.68	0.29	6.16	5.27	0.96	6.24	0.58	8.23	7.98	0.41	7.45	0.42
May-06	0.45	0.32	0.74	0.34	0.22	7.12	6.51	0.76	6.42	0.58	8.01	7.71	0.40	7.28	0.43
Jun-06	0.59	0.49	0.37	0.94	0.30	7.65	7.33	0.51	6.62	0.43	7.92	7.61	0.39	7.14	0.43
Jul-06	1.61	1.64	0.40	1.09	0.24	7.63	7.42	0.61	6.65	0.52	7.81	7.52	0.39	7.01	0.42
Aug-06	1.25	1.38	0.44	0.97	0.15	8.93	8.77	0.62	7.50	0.48	7.86	7.59	0.39	7.00	0.40
Sep-06	0.32	0.18	0.32	0.38	0.11	8.73	8.49	0.61	7.55	0.51	7.88	7.45	0.38	6.97	0.39
Oct-06	0.36	0.44	0.53	0.20	0.22	8.11	8.39	0.63	7.24	0.46	7.87	7.49	0.38	6.96	0.38
Nov-06	0.73	1.10	0.75	0.68	0.28	8.07	8.55	1.09	6.98	0.52	7.89	7.61	0.39	6.97	0.37
Dec-06	0.47	0.88	0.67	0.50	0.33	8.88	9.88	1.60	7.59	0.73	7.92	7.76	0.40	7.03	0.38
Jan-07	-0.88	-1.10	0.81	-0.36	0.52	6.64	7.29	1.04	6.26	0.57	7.74	7.68	0.39	6.96	0.37
Feb-07	1.04	1.19	0.36	0.95	0.21	7.39	8.12	1.23	6.53	0.64	7.69	7.71	0.40	6.91	0.35
Mar-07	0.49	0.27	0.51	0.18	0.31	7.67	8.14	1.02	6.55	0.66	7.75	7.85	0.40	6.93	0.34
Apr-07	0.31	0.07	0.80	-0.05	0.31	6.92	7.05	0.85	5.82	0.58	7.81	8.01	0.41	6.91	0.33
May-07	0.92	0.97	0.97	0.85	0.33	7.41	7.74	0.98	6.32	0.72	7.83	8.10	0.42	6.89	0.35
Jun-07	0.20	-0.09	0.46	0.92	0.20	7.00	7.12	0.67	6.30	0.61	7.77	8.07	0.41	6.87	0.36
Jul-07	1.01	1.08	0.39	1.10	0.26	6.37	6.53	0.67	6.31	0.62	7.66	7.99	0.41	6.84	0.36
Aug-07	1.32	1.46	0.45	1.06	0.23	6.45	6.61	0.60	6.40	0.55	7.45	7.80	0.40	6.74	0.38
Sep-07	2.13	2.32	0.57	1.54	0.23	8.37	8.89	0.79	7.57	0.57	7.43	7.84	0.40	6.75	0.41
Oct-07	1.23	1.27	0.58	0.90	0.17	9.31	9.79	0.85	8.27	0.61	7.54	7.99	0.41	6.85	0.44
Nov-07	0.14	-0.15	0.59	0.40	0.26	8.67	8.44	0.93	8.00	0.67	7.60	7.97	0.41	6.90	0.45
Dec-07	0.58	0.74	0.49	0.85	0.23	8.79	8.29	1.29	8.35	0.77	7.60	7.84	0.40	6.92	0.47
Jan-08	1.91	1.94	0.35	1.58	0.25	11.86	11.62	1.20	10.29	0.82	8.04	8.21	0.42	7.27	0.51
Feb-08	0.49	0.18	0.55	0.13	0.41	11.25	10.50	1.36	9.46	0.88	8.36	8.42	0.43	7.50	0.54
Mar-08	3.08	3.22	0.88	2.35	0.34	14.12	13.75	1.54	11.64	0.86	8.91	8.89	0.46	7.95	0.56
Apr-08	3.04	3.17	1.18	2.60	0.43	17.21	17.28	1.05	14.29	0.73	9.78	9.74	0.50	8.67	0.57
May-08	2.69	2.79	0.83	2.73	0.41	19.27	19.40	1.36	16.17	0.87	10.78	10.74	0.55	9.55	0.58
Jun-08	2.10	1.91	0.35	2.17	0.24	21.53	21.79	1.38	17.43	0.92	12.00	11.97	0.61	10.53	0.59
Jul-08	3.34	3.33	0.44	3.03	0.39	24.33	24.49	1.33	19.36	0.79	13.51	13.48	0.69	11.67	0.60
Aug-08	2.14	2.33	0.53	1.84	0.29	25.33	25.57	1.32	20.13	0.76	15.10	15.09	0.77	12.86	0.61
Sep-08	0.97	0.86	0.41	0.79	0.20	23.91	23.78	1.19	19.38	0.71	16.42	16.34	0.84	13.86	0.62
Oct-08	2.12	2.15	0.57	1.72	0.26	25.00	24.85	1.35	20.19	0.79	17.75	17.62	0.90	14.84	0.64
Nov-08	-0.12	-0.29	0.53	0.62	0.40	24.68	24.68	1.10	20.41	0.66	19.09	18.99	0.97	15.89	0.63
Dec-08	-0.50	-0.25	0.48	0.23	0.17	23.34	23.45	0.98	19.79	0.59	20.29	20.24	1.04	16.84	0.60
Jan-09	-0.42	-0.55	0.39	-0.13	0.31	20.52	20.43	0.75	18.08	0.55	20.97	20.94	1.07	17.44	0.56
Feb-09	0.95	1.22	0.34	1.15	0.23	21.07	21.69	1.13	19.10	0.70	21.75	21.84	1.12	18.19	0.55
Mar-09	1.37	1.94	0.70	0.95	0.25	19.07	20.17	1.83	17.69	0.87	22.11	22.34	1.15	18.59	0.54
Apr-09	1.41	1.10	0.85	0.98	0.29	17.19	17.76	1.10	16.07	0.75	22.04	22.32	1.14	18.68	0.52
May-09	0.23	0.04	0.82	0.40	0.40	14.39	14.61	0.88	13.74	0.69	21.55	21.81	1.12	18.39	0.48
Jun-09	0.99	0.70	0.36	1.32	0.27	13.14	13.25	0.84	12.89	0.73	20.77	21.01	1.08	17.90	0.45
Jul-09	1.54	1.61	0.38	1.30	0.22	11.17	11.37	0.85	11.17	0.72	19.60	19.84	1.02	17.14	0.44
Aug-09	1.70	1.66	0.51	1.30	0.27	10.69	10.64	0.82	10.63	0.71	18.33	18.38	0.94	16.29	0.45
Sep-09	0.45	0.38	0.38	0.39	0.19	10.12	10.11	0.78	10.23	0.68	17.15	17.05	0.87	15.49	0.48
Oct-09	0.95	0.89	0.45	0.66	0.15	8.87	8.74	0.66	9.17	0.63	15.79	15.61	0.80	14.56	0.51
Nov-09	1.39	1.27	0.48	1.35	0.22	10.51	10.45	0.69	9.90	0.55	14.65	14.35	0.74	13.69	0.51
Dec-09	-0.49	-0.36	0.51	0.04	0.23	10.52	10.32	0.72	9.72	0.56	13.65	13.19	0.68	12.87	0.51
Jan-10	2.42	2.47	0.31	2.28	0.29	13.68	13.68	0.81	12.13	0.58	13.15	12.59	0.65	12.42	0.52
Feb-10	0.39	0.37	0.28	0.58	0.22	13.04	12.73	0.77	11.56	0.58	12.57	11.84	0.61	11.87	0.52
Mar-10	1.25	1.29	0.22	0.99	0.16	12.91	12.01	1.09	11.61	0.66	12.12	11.15	0.57	11.42	0.51
Apr-10	1.73	2.07	0.71	1.85	0.42	13.26	13.09	0.81	12.48	0.65	11.84	10.76	0.55	11.16	0.51
May-10	0.06	-0.19	0.76	0.17	0.20	13.07	12.83	0.79	12.24	0.64	11.75	10.57	0.54	11.06	0.51
Jun-10	0.65	0.34	0.37	0.78	0.17	12.69	12.43	0.74	11.70	0.62	11.73	10.43	0.54	11.01	0.51

Source: Authors' calculations, except the official inflation rate for which the source is Pakistan Bureau of Statistics.

Table A2

Group-wise Change in Relative Price (July 01–June 10)

		Month on Month Inflation			Headline (Year on Year)			12-month moving average		
Group	Weight in CPI Basket	Observed Change in Relative Price (%)	Estimated Change in Relative Price (%)	S.E.	Observed Change in Relative Price (%)	Estimated Change in Relative Price (%)	S.E.	Observed Change in Relative Price (%)	Estimated Change in Relative Price (%)	S.E.
Food Beverages & Tobacco	0.403	0.14	0.18	0.001	1.62	1.72	0.01	1.47	1.72	0.01
Apparel, Textile & Footwear	0.061	–0.26	–0.21	0.004	–3.38	–3.15	0.09	–3.18	–3.22	0.07
House Rent	0.234	–0.06	–0.01	0.001	–0.51	–0.36	0.02	–0.55	0.04	0.02
Fuel & Lighting	0.073	0.03	–0.18	0.003	0.73	0.37	0.08	0.99	–0.44	0.06
Household Furniture & Equipment	0.033	–0.24	–0.18	0.008	–2.89	–2.37	0.18	–2.59	–2.16	0.14
Transport & Communication	0.073	–0.06	–0.14	0.003	–0.34	–1.06	0.08	–0.09	–1.37	0.06
Recreation & Entertainment	0.008	–0.45	–0.51	0.035	–6.20	–6.33	0.75	–6.17	–6.78	0.55
Education	0.035	–0.16	–0.20	0.008	–1.77	–1.48	0.75	–1.87	–1.58	0.13
Cleaning, Laundry & Personal Appearance	0.059	–0.17	–0.17	0.005	–2.08	–2.21	0.01	–2.04	–2.14	0.07
Medicare	0.021	–0.28	–0.27	0.140	–3.77	–2.86	0.29	–3.34	–3.42	0.22

Source: Authors' calculations.

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Book Reviews

Allan H. Meltzer. *Why Capitalism?* USA: Oxford University Press. 2012. 145 pages. US $ 21.95. Hardbound.

Why Capitalism? is written in response to the popular belief of "end of capitalism" that emerged in the aftermath of the 2008 financial crisis. In this book, the author criticises the anti-capitalism claim advocated by numerous writers who welcomed regulated markets and essential government intervention at the time of recession to fix the problems, which free markets cannot resolve by itself. While praising capitalism, the author argues that the success of capitalist system was inevitable over the last half decade in most of the countries. He believes that democracy along with capitalism is the best system since people, by their voting rights, choose their own tax rates and way of redistribution of wealth. Furthermore, according to him it is the only system, which faced many challenges, but not only survived but came out stronger and dominated the world. Theoretically, the author's arguments, in this book are very attractive but in practice give rise to several questions.

The book is written following the sayings of 18th century German Philosopher Immanuel Kant. The author has also included ideas of Friedrich Hayek, Milton Friedman and Karl Popper to buttress his claims. It supports pure capitalism, which differs from democratic capitalism being practiced in most of the countries, which involves socialistic norms of governing. In a democratic capitalist system, median voter belongs to the middle class, whose main agenda is to redistribute wealth from high-income people to lower income people, collected mostly through taxes. Author tends to differ from this kind of system.

The book comprises six chapters, which address various issues such as the importance of capitalism, problems of regulations and the welfare state, the problem of big deficits and how to overcome the problem by taking different measures, post-war progress of capitalism, importance of foreign aid and questions on inflation return. Praising capitalism and criticising the critics of capitalism, the author argues that morality is important for any economic system but we cannot blame capitalism for individuals' moralities. Moralities fall under the domain of individual behaviour. Rather, rule of law is what is important in the system which capitalism implements the best among others. He further clarifies the problem of efficiency and argues that people differ in their potentials, which leads to inequality and it is not the system *per se* which creates inequality.

Comparing different systems with the capitalist system, he argues that in general anti-capitalists commit three types of errors in understanding capitalism. Firstly, they ignore Immanuel Kant's warning that humans are imperfect. Secondly, they ignore

differences among individuals and instead of focus on fairness, equality and justice in place of individual choice. The author admits that capitalism may not perform efficiently due to individual choices because individual choices are not part of the capitalism. Finally, according to the author, the critics of capitalism ignore the fact that the choice of ruler is enforced using fear and terror or through imprisonment and punishments, whereas these problems persist regardless of the system and therefore it is an undue criticism on the capitalism.

In the book, the author also criticises the socialist side of democratic capitalist countries, such as the USA, in which resources are redistributed by taxing people. He claims that these policies are adopted in order to please the voters. The voters do not know, in general, from where the money is coming. Similarly, the governments announce tax benefits without reducing the benefits. The author claims that during the era of slow growth the governments borrow money for these policies. These policies, in turn, give a gift of piling public debt in the long-run, with detrimental debt-service payments.

Writing against different regulations, the author asserts that regulations give control to the government sector in allocating resources, which is an inefficient outcome. Moreover, it invites corruption, arbitrary decision-making and circumvention from tax authorities. The author points out an interesting fact that regulations are generally made by lawyers who do not know the economic incentives, which those regulations can create. Therefore, the regulation procedures adopted by the democratic capitalism is flawed which creates inefficiencies in the system.

The author notes that large fiscal deficits have emerged and is creating numerous problems for several economies, including the United States. The author comprehensively reviews the main cause of increase in debt, i.e., continuous deficit and then proposes different possible solutions to mitigate the problem, which include cutting down foreign and domestic military spending, increasing tax revenues and try to achieve budget balance policies. Author also argues against the use of discretionary monetary policy, which is either due to budget deficit financing or other political reasons that creates surprise inflation in the economy.

Attributing the post-war progress to capitalism rather than to other forms of government, the author argues that capitalism is good for growth. Arguing in favour of rules, he believes that rules are good for growth but rules need to be changed with change in other circumstances such as rules of trade, finance and political stability that helps in fostering growth.

The author also comprehensively examines foreign aid-growth nexus. He argues that World Bank gives loans to several countries despite different levels of risk of the countries. For example, China is relatively more stable than Pakistan and Sudan. Furthermore, countries who ask for loans are more corrupt and have inherently weaker systems. The World Bank gives loans to all the countries without giving any considerations on how to promote growth, ease market constraints, and reduce corruption. In a nutshell, he concludes that capitalism disperses power and limits corruption. Moreover, foreign aid merely is not a good determinant to eradicate corruption and remove other obstacles of growth.

Bailing out was among the major characteristics of financial crisis which lead researchers/writer/readers to believe in the "end of capitalism". The author asserts that

regulations are static in nature and markets are dynamic which change very frequently thus further reforms are needed to cope with the changing dynamics of the markets. Therefore, banks need to hold more capital to avoid bailout in the presence of financial/banking crisis.

In the last chapter, apart from talking about regulations, banking, and financial crisis, he also analyses inflation and gives several reasons why inflation will return. Increase in money supply due to political pressure to decrease unemployment is among the top reasons that create surprise inflation in the economy. Moreover, due to different episodes of surprise inflation, exchange rates (flexible) change frequently. Thus, he proposes a rule-based policy structure, i.e., dollar, euro, and yen should commit to inflation between 0-2 percent and any other country which wishes to import low inflation can follow any of the three currencies. He further adds that China can join hands with these three countries if it allows its currency to free float.

In the entire book, the author believes socialism is the only alternative system, which can combat capitalism. He compares different socialist countries with capitalist countries and concludes that capitalist countries enjoy higher growth and more freedom. However, the author fails to include other economic systems in his analysis, such as the Islamic economic system. Therefore, the author's support to capitalism as the best system that provides growth and personal freedom may be a biased statement.

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Darn Acemoglu and James A. Robinson. *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. New York: Crown Business. 2012. 529 pages. U.S $ 17.00.

"Why Nations Fail: The Origins of Power, Prosperity and Poverty" is an impressive book by Daron Acemoglu and James A. Robinson. In this book, the authors attempt to solve the longstanding puzzle that why some nations, such as the United Sates, Great Britain, Germany, etc. are rich today, and why the others, such as Zimbabwe, Ghana, Egypt, etc. are poor. The authors show with the help of substantial historical evidence that man-made economic and political institutions matter for the vast differences in the level of economic development among countries. They argue history is the key to understand the difference and evolution of economic and political institutions in different parts of the world. During historical evolution of the institutions, small differences and contingency (e.g., Black Death) matter a lot. According to them, it is not the geography, culture, weather or the choice of wrong policies that make countries rich or poor but it is the institutions that make countries rich or poor.

Institutions, defined as the rules that govern and shape economic and political life, are of two types: inclusive and extractive. Inclusive political institutions are those that are sufficiently pluralistic and are politically centralised. The institutions that do not have these two or any of these characteristics are defined as extractive political institutions. Inclusive economic and political institutions secure property rights, ensure law and order, create incentives for research and innovation and provide level playing field for all the individuals of the state. In addition, inclusive institutions bring a broad cross-section of the society into decision-making process (pluralism) and put restraints and checks on their élites. Extractive institutions, on the other hand do not have these attributes. Societies with inclusive institutions tend to be richer and more prosperous than those with extractive institutions. The pluralistic societies have political institutions that distribute power broadly, engage more people in the process of decision-making and face fewer constraints in the wielding of power.

United States have pluralistic and centralised political institutions that can wield their power to impose their decisions. On the other hand, political institutions in Somalia, for example, are almost pluralistic but none of the institutions is centralised and has power to dominate other institutions. Therefore, the US ends up with greater prosperity and wealth, while Somalia ends up in chaos and poverty.

To assert their point that geography, culture and weather are not the determinants of economic prosperity and wealth but the man-made political institutions are, the authors illustrate the example of South Korea and North Korea. Both these countries have the same geography, culture, weather and people but South Korea is an example of economic success and prosperity whereas North Korea is an example of economic and political disaster.

The book further argues that when countries are distant from the technology frontier, they can grow under extractive institutions and absolutist regimes but this growth cannot be sustained. Once countries reach the frontier, they remain there or fall behind due to lack of technological innovation and lack of creative destruction that is necessary for sustained economic growth. Under Communism, Russia made impressive economic growth and it even surpassed the West in military and space technology but

could not sustain it and disintegrated into many parts. Like Russia, China's institutions are also extractive and political regime is absolutist not pluralistic. China is also making economic progress but that progress cannot go on because to sustain growth, technological innovation and creative destruction is necessary. And it happens in pluralistic political societies with inclusive economic and political institutions.

To answer the question that why some countries have inclusive political and economic institutions and others do not, Acemoglu and Robinson argue that small critical junctures and contingency in the history of nations matter. There is no natural process whereby absolutist regimes and extractive political and economic institutions evolve into pluralistic political societies and inclusive institutions. It is only in the interest of élites to cede power to inclusive institutions if they have fear of revolution. Authors argue that for inclusive economic institutions, political inclusive economic institutions are complementary. The roots of economic prosperity lie in inclusive economic and political institutions, political struggle against the elites and the privileged. The nations that have had this struggle in their history end up having inclusive political and economic institutions and pluralistic political societies with centralised power. These nations like the Great Britain, France, and the United States are among the most prosperous nations of today world.

To understand the nature of differences in the institutional structure, understanding history is necessary. The book presents a tool to understand the nature and role of different types of economic and political institutions and how these differences translate to differing consequences for economic trajectory of nations. The book helps to predict the economic trajectory of the nations that they make take on in the future several decades. Countries that have made sufficient strides toward economic inclusive institutions and politically pluralistic societies with centralised power would be able to grow in the long-run and countries that have not would remain in their current scenario. For example, Afghanistan, Haiti and Somalia are unlikely to grow or able to bring major reforms in their institutions. On the other hand, the Sub-Saharan African countries, such as Burundi, Ethiopia, Rwanda and Tanzania, and Latin American countries including Brazil, Chile, and Mexico would take on the trajectory of higher economic growth in coming several decades.

However, authors argue that their theory requires great caution in making such predictions since response to same policy interventions depends on the institutions in place in different nations. In addition, a confluence of factors (small differences, contingency, vicious and virtuous circles) works in shaping the institutions. Vicious circle implies extractive institutions can recreate themselves in the aftermath of a political struggle against extractive institutions. For example, in Egypt people managed to overthrow Hosni Mubarak from power in the hope to get pluralistic society and inclusive economic institutions. Despite their efforts and a vibrant pro-democracy movement, extractive institutions have recreated themselves. Contingent elements in history make it difficult to predict whether an interplay between critical junctures and existing institutions results in extractive institutions or the inclusive ones. Despite the caution, in the concluding Chapter, the authors propose some policy recommendations based on their theory of institutions.

First, to prosper and grow nations should focus on the root cause of the problems. Without addressing root causes of problems (extractive institutions and politics that keep such institutions in place), the policies of growth are unlikely to be successful. Secondly, foreign aid, conditional or unconditional, has been at the heart of policy prescriptions of international organisations (IMF, the World Bank etc.) and western governments as a panacea for poverty of the third world nations. But it has not been very effective in changing the destiny of these nations. Since flows of foreign aid do not address the roots of the problem as the roots of world inequality and poverty lie in the underlying economic and political institutions of the countries. The foreign aid should be used to shape these institutions to make foreign aid useful. Thirdly, the book suggests that empowerment of the large factions of the people is necessary for inclusive economic and political institutions. Media can play a positive and vibrant role in bringing masses into decision-making process. Book emphasises on the role of civil society, trade unions, student unions and of social media to make privileged and the elites accountable.

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Shorter Notices

Kawai, Masahiro, Mario B. Lamberte, and Yung Chul Park (eds.). *The Global Financial Crisis and Asia: Implications and Challenges*. Oxford: Oxford University Press. 2012. 344 pages. £58.00.

Of the Black Swans hitting the world economy, Global Financial Crisis (GFC) of 2006-07 remains most significant, in both breadth and severity, the impact of which lasts until now. The lessons learned and policy responses to the crisis keep framing the future mitigation of the identical crises. The crisis of 2006-07 has had serious implications and repercussions for the world economy with varying magnitude. This book, as suggested by the title, studies the implications of GFC for Asia, a region already hit by Asian Financial Crisis of 1997-98 and, more importantly, a region likely to be the main driver of the world economic performance in future. The book, divided in four sections carrying 13 essays, provides a systematic study of the crisis triad: the causes, consequences and contagion in more of a qualitative manner. The book starts with the fact that Asia remains least hit by GFC and that the impact, having multi-channel transmission mechanism, operated primarily through declined exports rendering Asia a lower economic growth region. On transmission of the GFC, the book finds US housing and financial market development the chief operators. An insightful discussion on fundamental factors underlying the crisis is provided. The book confirms an aggressive policy response to the crisis of which monetary and fiscal policies remain the centre of response strategies. Successful revival of the Asian economies, according to the book, suggests lower vulnerability of the region to external shocks. The concluding part of the book, highlighting the role of Asia in global economy as the major driver, given the limited role for Europe and US economies, asks for the need for more inclusive growth policies to turn the achieved growth patterns sustainable. The book offers case studies and draws implications for major economies of Asia including, among others, Japan, Korea, Malaysia, China and India. The book further suggests that regional cooperation can be a good combating tool in tackling external shocks. (*Sajid Amin Javed*)

CUTS International. *Reforming Non-Tariff Barriers: Case for a Participatory Approach in South Asia*. Jaipur, India: CUTS International. 2013. xli+207 pages. $25.00.

This book is about addressing the issue of non-tariff barriers (NTBs) in South Asia, which stand in the way of realizing huge intra-regional trade potential present in South Asia. The main premise of the book is that although both tariff and non-tariff components hinder the intra-regional trade, the latter poses the bigger threat. According to the book, there are several reasons to reform the current NTB regime. To begin with, rapid regional trade integration in other parts of the world has force the South Asian

countries to access those markets with their traditional exports. In addition, the indifference of the member countries has not only slowed trade liberalisation in the region but it has also rendered it less prepared than the other regions of the world to benefit from global trade liberalisation. To buttress the claim that there are several NTBs hindering trade liberalisation in South Asia, sector-specific case studies from Bangladesh, India, Nepal, Pakistan and Sri Lanka are also included in the book. The book argues that the measures taken, thus far, to remove NTBs are inadequate, which calls for a new strategy. The book finds that the South Asian Free Trade Agreement (SAFTA) does not possess satisfactory tools to deal with trade facilitation measures due to which the system cannot tackle NTBs adequately. Furthermore, the lack of clear definitions and unavailability of data, among other things, has exacerbated the situation. The book proposes a participatory approach to tackle NTBs in the South Asian region to overcome problems marring trade liberalisation in the region under the current approach. This approach is based on a comparative principle that compares current trade conditions to possible cheaper alternatives. The book argues that the proposed approach is better than the current approaches as it will solve the issues relating to definitions, data insufficiency and incentives. The South Asian Association for Regional Cooperation Chambers of Commerce and Industry (SAARC CCI), which is the apex body of all national federations and chambers of industries in the SAARC region, can play an important role in realizing the participatory approach proposed in the study. Using the newly generated database on trade cost indicators developed by UNESCAP, the book shows that as much as 7.26 percent of value of the total intra-regional trade can be saved even if the minimum level of reforms proposed in the book are adopted. At the end of the book, a Business Plan for reforming NTBs in South Asia is presented which calls for more focused use of national trade policy instruments. It also advocates targeting selected products that have highest trade potential as a first step in implementing the proposed NTB reforms. (*Omer Siddique*)