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SPATIAL PATTERNS OF REVEALED COMPARATIVE ADVANTAGE OF PAKISTAN'S AGRICULTURAL EXPORTS

KHALID RIAZ and HANS G. P. JANSEN*

Abstract. Pakistan is widely believed to be underperforming as far as its agricultural export potential is concerned. However, analyses to support this allegation are very few, in part due to the lack of easily accessible data. By using a detailed data set on country level trade flows and adapting Balassa's concept of revealed comparative advantage to regional context, this study attempts to fill this knowledge gap. Revealed comparative advantage indices for a fairly wide range of Pakistan's agricultural exports to several regional markets and country markets are presented. Unlike earlier analyses that looked at the world market only, analysis of spatial patterns of revealed comparative advantage offers new insights. Several product and region combinations are identified where Pakistan has demonstrated comparative advantage despite not enjoying such advantage at the world level. In addition, the analysis highlights opportunities in bilateral trade, especially in trade with neighbours. Finally, the approach identifies top export markets for Pakistan's main exports, and sheds light on the types of agricultural products from Pakistan that have the potential for penetrating the markets in developed countries.

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*The authors are, respectively, Professor, Department of Management Sciences, COMSATS Institute of Information Technology, Islamabad (Pakistan), and Senior Agriculture Economist, Sustainable Development Network, Agriculture and Rural Development Unit, South Asia Region (SASDA), World Bank.
Corresponding author e-mail: kriaz100@gmail.com

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I. INTRODUCTION

Many analysts of the Pakistan economy in general the agriculture sector in particular believe that the country is punching below its weight as far as agricultural export performance is concerned. Specifically it is often argued that Pakistan has a comparative advantage in a number of agricultural commodities but fails to exploit this advantage to its fullest potential in overseas markets.

However, little or no analysis has been done that sheds some more light on this issue, in the sense of better specifying in which commodities and which markets Pakistan's comparative advantage is strongest. This paper attempts to start filling that void by quantifying the degree of comparative advantage of Pakistan agricultural export products in major overseas markets. This quantification is a necessary first step in getting a better handle on the factors that may limit the extent to which Pakistan is able to enter markets where it has a comparative advantage. Expansion of Pakistan's share in overseas export markets is crucial for further development of the country's agricultural sector.

Mahmood (2004) analyzed comparative advantage for Pakistan's non-agricultural sector. Hanif and Jafri (2008) studied RCA for Pakistan textile sector, and Mehmood *et al.* (2012) focused on chemicals sector. Only a few studies have attempted to analyze actual comparative advantage for Pakistan's agricultural exports. For example, Akhtar *et al.* (2009) constructed RCA index for Pakistan's fruit exports. Samaratunga *et al.* (2007) and CARIS (2008) considered the country's revealed comparative advantage for a few broad categories of agricultural products. Riaz (2009) was the first study that estimated RCA indices for a fairly wide range of agricultural products, using the world market for each product as the reference market. However, to better understand factors that limit Pakistan's agricultural export potential, there is a need to identify specific markets and products where the country enjoys demonstrated comparative advantage. The present paper extends the analysis of Riaz (2009) by incorporating spatial dimensions into investigation of relative export performance. We demonstrate that new insights can be gained by considering actual export performance at regional levels and within the context of bilateral trade, and especially the trade with neighbours.

The paper analyzes actual export flows and calculates measures of revealed comparative advantage. The focus in this paper being on agricultural trade, the analysis is based on international trade data that incorporates a unique degree of detail not seen before in trade analyses for Pakistan.

The paper is organized as follows. The next section presents the concept of revealed comparative advantage due to Balassa, and explains how the concept can be operationalized to measure revealed comparative advantage in the regional context. The spatial patterns of revealed comparative advantage are analyzed from three alternative vantage points. Section III identifies product-region combinations where agricultural products demonstrated strong relative export performance. This is followed in the next section by an analysis of revealed comparative advantage in Pakistan's trade with its neighbours. What are the top regional markets for Pakistan's main agricultural products? This question is addressed in section V. The last section provides conclusions and recommendations.

II. THE CONCEPT OF REVEALED COMPARATIVE ADVANTAGE

Revealed comparative advantage (RCA) indices offer a useful way of analyzing a country's comparative advantage, based on demonstrated (*i.e.* actual) export performance. This contrasts with other popular measures such as the domestic resource costs coefficients (DRCs) that are considered indicators of potential comparative advantage and often used in *ex-ante* types of analysis of export possibilities.[1]

The original RCA measure was proposed by Balassa (1965) who defined the export performance of a specific product/industry from a country – as measured by revealed comparative advantage index – as the relative share of

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[1]The DRC ratio of a traded product is the ratio of the domestic social costs of export production to foreign exchange earned (Bruno, 1963). The numerator is domestic resources and non-traded inputs valued at their opportunity costs, and the denominator is the net foreign exchange earned or saved (*i.e.* value added) by producing the product domestically. The DRC can be loosely interpreted as "the domestic resources needed to generate one unit of foreign exchange". Since output and tradable inputs are valued at border (world market) prices, a DRC ratio smaller than one is indicative of "efficient" national production giving the country a "comparative advantage" in the product in question.

The studies that used DRCs to investigate Pakistan's ex ante comparative advantage in agricultural products include Qudus and Mustafa (2011), Fatima *et al.* (2007), Khan (2001), AERC (1991), Ahmed (1993), Apleyard (1987), Longmire and Debord (1993), Maan and Khawaja (1993) and Mahmood (1991).

the country's export of the product in the world export of the same product, divided by the overall share of the country in world exports. More specifically, the revealed comparative advantage index of product *j* exported from country *i* (RCA_{ji}) can be expressed as follows:

$$RCA_{ji} = \frac{\frac{X_{ji}}{X_{jw}}}{\frac{X_i}{X_w}} \quad (1)$$

Where

X_{ji} = exports of product *j* from country *i*

X_{jw} = world exports of the product *j*

X_i = exports of country *i*

X_w = world exports

The *RCA* index ranges from 0 to infinity with 1 as the break-even point. That is, a *RCA* value of less than 1 means that the product has no export comparative advantage, while a value above 1 indicates that the product has a "revealed" comparative advantage.[2] It should be noted that the *RCA* index is not symmetrical in the sense that one cannot compare both sides of the break-even point.[3]

MEASURING REGIONAL REVEALED COMPARATIVE ADVANTAGE

The *RCA* index presented earlier in Section II (equation (1)) uses the world market as the reference market. In order to enable disaggregation of the analysis of revealed comparative advantage at the regional and bilateral levels, equation (1) was adapted as follows:

$$RCA^R_{ji} = \frac{\frac{X^R_{ji}}{X^R_i}}{\frac{X_{ji}}{X_i}} \quad (2)$$

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[2]Note that RCA_{ji} can also be written as $(X_{ji}/X_i) / (X_{jw}/X_w)$ which when larger than one can be interpreted as "country *i* has a revealed comparative advantage in product *j* because the share of product *j* in country *i*'s total exports exceeds the share of product *j* in total world exports".

[3]The aspect of symmetry was addressed by Laursen (1998).

Here RCA_{ji}^{R} is the revealed comparative advantage index for exports of product *j* from country *i* into region *R*, and

X_{ji}^{R} = Exports for product *j* from country *i* to region *R*

X_{i}^{R} = Exports of country *i* to region *R*

X_{ji} = Total exports of product *j* from country *i*

X_{i} = Total exports of country *i*

If RCA_{ji}^{R} exceeds one then we conclude that the country *i* has a comparative advantage in the export of product *j* to the reference market *R*. This is so because a value of this index greater than unity implies that the share of product *j* in country *i*'s exports to region *R* exceeds the share of product *j* in the country's total exports.[4] The reference market may be a region such as the EU or SAARC, or alternatively it could be a single country such as the USA or UAE.

The conceptual *RCA* index defined above is quite flexible in terms of both product definition and geographic coverage of the markets considered. Various definitions of the 'product' can be used to compute the value of the index. For the purposes of this paper, the Standard International Trade Classification (SITC[5]) was used because it allows products to be defined at various levels of aggregation. Moreover, the flexibility of the index with respect to geographic coverage means that relative export performance can be studied at global or at regional levels.

The analysis in this paper spans a ten year period from 1999-2008 and the data were obtained from IMF's trade database.[6]

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[4]Note that RCA_{ji}^{R} can also be written as (X^{R}_{ji}/X_{ji}) / (X^{R}_{i}/X_{i}) which resembles Balassa's original measure but narrows it down to the RCA of a country (in this case Pakistan) in a particular geographical area (in this case region *R*).

[5]The SITC system was developed by the UN in 1962 with the intention of classifying traded products not only on the basis of their material and physical properties and stage of processing but also their economic functions in order to facilitate economic analysis. From 2007 onwards the SITC consists of 10 one-digit sections, 67 two-digit divisions, 262 three-digit groups, 1,023 four-digit groups, and 2,970 five-digit headings. Section "0" is "Food and Live Animals". For detailed information see Shaw (2009).

[6] See http://www.imfstatistics.org/DOT/.

For the purposes of this study, Pakistan's agricultural exports were taken to be products listed under the SITC's 'Food and live animals' (code = 0) category. From the perspective of analyzing trade performance, only a those agricultural products are included that figure prominently in Pakistan's exports. The following categories were therefore selected at the SITC 2-digit level:

01 – Meat and meat preparations

02 – Dairy products and birds' eggs

04 – Cereals and cereal preparations

05 – Vegetables and fruit

Each of these categories has several sub-categories and more than 20 disaggregated products were considered for this study. On the other hand, in this preliminary investigation also some other agricultural products were excluded. Among these are cotton (SITC code 263) which is a key cash crop in Pakistan; fish (SITC code 03); hides and skins (SITC code 21); and cut flowers and foliage (SITC code 292.7). In recent years Pakistan has become a net importer of cotton. The share of other excluded products in Pakistan's exports is relatively low, although they remain in the domestic market.

DEFINING REGIONAL MARKETS

Having defined revealed comparative advantage at regional level, the next step is to define regions. Towards this end, a regional classification of countries was developed based on the UN regional classification and other major economic groupings. The economic groupings selected were the European Union (EU), South Asian Association for Regional Cooperation (SAARC), Association of South East Asian Nations (ASEAN) and the Gulf Cooperation Council (GCC).

Some of the regional groupings such as the EU have highly uniform trade policies and no barriers to trade between member states. Other economic groupings have varying degrees of common trade policies. For example, while SAARC member countries are gradually introducing preferential trade arrangements for other members under the South Asia Free Trade Agreement (SAFTA), many obstacles remain (for an in-depth discussion of SAFTA, see Chapter III in World Bank 2010). In most cases, however, countries within a particular regional grouping have some common characteristics. For example, the EU is dominated by highly developed industrial economies and a number of economies in transition; ASEAN comprises mostly newly industrialized countries; and GCC is a grouping of

oil-rich Middle Eastern states. These common characteristics generate similar demand patterns that provide a strong rationale for constructing regional (synthetic) RCA indices.

In addition to economic groupings, countries were also classified based on their respective geographic sub-regions. These sub-regional groups included Central Asia, North Africa, Sub-Saharan Africa and Latin America. Broad similarities in levels of economic development and other geographic characteristics within sub-regions provide some justification for this classification.

Partial overlap of economic groupings and regions made it necessary to classify countries in a sub-region that were not in the relevant regional economic grouping into 'Rest of' regional groups. The latter include Rest of East Asia (RO EASTASIA), Rest of Europe (RO EUROPE), Rest of Middle East (RO Middle East) and Rest of the World (RO World). Finally, some large countries were treated as entirely separate markets including USA, China, Japan, Russian Federation, Australia, Canada and Mexico.[7]

III. SPATIAL PATTERNS OF REVEALED COMPARATIVE ADVANTAGE

This section presents patterns of comparative advantage for main categories of Pakistani agricultural exports with a view to identify product and market combinations where relative export performance has been demonstrably strong. The various tables in this section mention only those regions where Pakistani export products have a revealed comparative advantage (*i.e.* markets where RCA values exceed 1).

MEATS AND MEAT PRODUCTS

Although livestock contributes over half of Pakistan's agricultural GDP, the country does not have a worldwide comparative advantage in meat and meat products (see Table 1 in section IV.1 above). Low productivity in the livestock sector, sizeable domestic demand, and the inability to meet overseas SPS requirements are some of the factors that explain the modest export performance. However, once comparative advantage is analyzed on a

[7]Mexico was taken as a separate market because the remaining two North American countries – USA and Canada – were similarly treated. The other possibility would have been to lump together all three as North American Free Trade Agreement (NAFTA) countries. However, the size of the US market and the importance of its trade relations with Pakistan weighted in against doing this.

regional basis, it turns out that beef and meat exports from Pakistan do enjoy a comparative advantage in the GCC region with RCA indices exceeding 5 for both product categories (Table 1). This can largely be explained by the geographical proximity of the GCC region to Pakistan. In addition various types of meat offal find good markets in China and East Asia.

TABLE 1

Regional RCA of Pakistani Meat Products in Different Regions

SITC code	Product category	Region	RCA
011	Beef, fresh/chilld/frozn	Gulf Coop Council	5.52
012	Meat n.e.s., fresh/ chilld/frozn	Gulf Coop Council	5.48
016	Meat/offal preserved	Gulf Coop Council	5.20
017	Meat/offal presvd n.e.s.	China	2.07
017	Meat/offal presvd n.e.s.	Gulf Coop Council	1.80
017	Meat/offal presvd n.e.s.	RO_EASTASIA	2.29
017	Meat/offal presvd n.e.s.	SAARC	3.06

TABLE 2

Regional RCA of Dairy Products and Eggs and Sub-categories

SITC code	Product category	Region	RCA
02	Dairy products and eggs	SAARC	4.57
022	Milk products excl butter/cheese	SAARC	5.07
023	Butter and cheese	EU	1.08
023	Butter and cheese	Gulf Coop Council	1.63
023	Butter and cheese	RO_EASTASIA	2.47
023	Butter and cheese	SAARC	2.93
024	Cheese and curd	Gulf Coop Council	3.75
024	Cheese and curd	USA	1.41
025	Eggs, albumin	Gulf Coop Council	1.23
025	Eggs, albumin	RO_MIDEAST	1.27
025	Eggs, albumin	SAARC	3.80

Table 2 indicates that the dairy products and eggs category (SITC code 02) have strong revealed comparative advantage in the SAARC market only. The same is true for SITC code 022 which mainly consists of milk powder. On the other hand, a number of other sub-categories representing processed dairy products (milk powder, butter, cheese and curd) also enjoy a comparative advantage in several other markets, including some in developed countries. For example, butter, cheese and curd products (SITC codes 022 and 023) have strong revealed comparative advantage in both SAARC and GCC regions with the RCA measure approaching 4 in both cases. This is followed by good relative export performance in East Asia (non-ASEAN countries). But perhaps even more importantly, Pakistani exports of butter, cheese and curd enjoy a certain degree of comparative advantage in the high-income EU and US markets where consumers are particularly quality-conscious. This suggests that moving up the processing chain can allow penetration into markets of high-income regions.

CEREALS

Although Pakistan is a large producer of wheat, it is not a significant wheat exporter mainly because of high domestic demand. Nevertheless, wheat exports to Afghanistan – through official and informal channels – take place on a regular basis, mainly driven by Afghanistan's traditional (but highly variable) food grains deficit and Pakistan's relative geographic proximity.[8] This situation is reflected in relatively high value of the RCA index of 2.4 for the SAARC region as a whole (Table 3).

Rice is Pakistan's largest food export earner. From a regional perspective, promising export destinations for this product are in Middle East and sub-Saharan Africa (Table 3). However, at a more disaggregated level there are several individual countries that are good markets of Pakistani rice, as will become clear from the discussion of bilateral RCA indices in section VII below.

Over the last decade, maize productivity in Pakistan has been on an upward trend mainly due to the increased use of hybrid seeds. Table 3 shows that the RCA index for maize is highest in "Rest of the World" region (6.36), followed by the ASEAN region (3.86) and the Gulf countries (1.95). Just like rice the export performance of Pakistani maize in high income country markets is also fairly robust (see section VII).

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[8]The links between food security in Pakistan and Afghanistan are discussed in detail in World Bank (2010).

TABLE 3

Regional RCA for Cereals

SITC code	Product category	Region	RCA
041	Wheat/meslin	ASEAN	1.37
041	Wheat/meslin	Gulf Coop Council	1.21
041	Wheat/meslin	North Africa	1.16
041	Wheat/meslin	SAARC	2.42
041	Wheat/meslin	Sub Saharan Africa	1.71
042	Rice	Gulf Coop Council	2.31
042	Rice	Sub Saharan Africa	1.10
043	Barley grain	Gulf Coop Council	1.96
043	Barley grain	SAARC	4.54
044	Maize except sweet corn	ASEAN	3.86
044	Maize except sweet corn	Gulf Coop Council	1.95
044	Maize except sweet corn	RO_WORLD	6.36
044	Maize except sweet corn	RO_WESTASIA	1.27
044	Maize except sweet corn	SAARC	1.59

Barley grain exports seem largely to result from the proximity advantage in the SAARC (mainly Afghanistan) and GCC markets.

VEGETABLES

Exports in the fresh, chilled, and frozen vegetable category (SITC code 054) show revealed comparative advantage in South Asian and Gulf countries (Table 4). This pattern of revealed comparative advantage is a result of the transport cost advantage, limitations imposed by perishability of vegetables, and relatively lower SPS standards in these markets. At the same time the latter two factors also prevent exports to farther away (but higher value) markets in Europe and North America, at least for the time being. The transport cost advantage of Pakistani vegetable exports is less in the Gulf than within South Asia which is reflected by a lower value of the RCA index.

Processed vegetable products not only have much longer shelf life and are less bulky, but the higher degree of processing also makes it possible to conform to more stringent quality requirements. Vegetable preparations and preserved vegetables enjoy relatively strong comparative advantage in the

EU and non-EU European markets. This again underscores the fact that processing can help opening up markets in more developed countries.

TABLE 4

Regional RCA for Vegetables and Processed Vegetable Products

SITC code	Product category	Region	RCA
054	Vegetables, fresh/chilled/ frozen	Gulf Coop Council	1.38
054	Vegetables, fresh/chilled/ frozen	SAARC	3.48
056	Vegetable root/tuber preparations/preservatives	EU	2.89
056	Vegetable root/tuber preparations/preservatives	RO_EUROPE	1.65

ORANGES AND MANDARINS

Pakistan is the largest exporter of *Kinnow* mandarin in the world. On the other hand, exports of (sweet) oranges are relatively minor, and strong export performance of *Kinnow* is limited to regional markets in the ASEAN and Gulf countries (Table 5).

TABLE 5

Regional RCA for Oranges and Mandarins

SITC code	Product category	Region	RCA
05711	Oranges, fresh or dried	ASEAN	1.44
05711	Oranges, fresh or dried	CANADA	3.11
05711	Oranges, fresh or dried	Gulf Coop Council	1.57
05711	Oranges, fresh or dried	RO_WORLD	1.71
05711	Oranges, fresh or dried	SAARC	2.84
05711	Oranges, fresh or dried	Sub Saharan Africa	2.40
05712	Mandarins etc. fresh/ dried	ASEAN	2.02
05712	Mandarins etc. fresh/ dried	Gulf Coop Council	1.73

Outside of these regions there are individual country markets such as Iran where *Kinnow* exhibits strong relative export performance (see section VII). However, the strong revealed comparative advantage of *Kinnow* does not seem to exist in developed country markets. The reasons for this are more stringent SPS requirements, higher degree of bitterness in taste compared to oranges, and large numbers of seeds in the fruit.

OTHER FRUITS AND FRUIT PREPARATIONS

Pakistan has a substantial comparative advantage in the export of dates (SITC code 0596) to countries in the SAARC region (Table 6). In the case of Pakistan, the category fresh 'avocado/mango/guava' (SITC code 0597) represents primarily mango exports. The revealed comparative advantage in this category is strong in markets in Europe and Gulf countries (Table 6).

TABLE 6

Regional RCA for Mangoes, Other Fruits and Fruit Preparations

SITC code	Product category	Region	RCA
0596	Dates, fresh/dried	SAARC	4.91
0597	Avocado/mango/guava fresh	EU	1.19
0597	Avocado/mango/guava fresh	Gulf Coop Council	4.13
058	Fruit preserved/fruit preps	EU	1.13
058	Fruit preserved/fruit preps	Gulf Coop Council	1.76
058	Fruit preserved/fruit preps	SAARC	1.12
059	Fruit/vegetable juices	EU	1.78
059	Fruit/vegetable juices	SAARC	2.39

For Pakistan this is the only example of a product with a rather modest level of processing[9] that has strong revealed comparative advantage in developed country markets. This is attributable to the high quality of mango varieties grown in Pakistan. On the other hand, equally noteworthy is the fact that similar inroads have not been made into the US market, possibly due to

[9]Mango processing largely consists of grading, cleaning, and packaging.

more stringent SPS requirements and transport disadvantages. It has been observed that mangoes from Pakistan have 'excellent eating qualities' but inconsistent quality and relatively short shelf life (see *e.g.* Jansen, 1991). As a result Pakistan mangoes fetch relatively low prices even in high quality markets (Collins *et al.*, 2006). Table 6 also shows that preserved fruits, fruit preparations, and fruit juices have substantial revealed comparative advantage in the high income EU and GCC markets.

IV. BILATERAL TRADE BETWEEN PAKISTAN AND NEIGHBOURING COUNTRIES

This section presents and discusses patterns of revealed comparative advantage with Pakistan's principal neighbours: Afghanistan, China, India and Iran.

AFGHANISTAN

Pakistan provides the main transit trade route for land-locked Afghanistan. The most diversified pattern of comparative advantage of Pakistani products exists in the Afghan market (Table 7).

TABLE 7

RCA with Afghanistan

SITC code	Product category	RCA
017	Meat/offal preserved n.e.s.	11.6
022	Milk products excluding butter/cheese	34.9
023	Butter and cheese	29.1
025	Eggs, albumin	18.4
041	Wheat/meslin	17.0
042	Rice	2.1
043	Barley grain	29.8
044	Maize except sweet corn	16.0
045	Cereal grains n.e.s.	20.1
046	Flour/meal wheat/meslin	33.2
047	Cereal meal/flour n.e.s.	9.9
048	Cereal etc flour/starch	4.4
054	Vegetables, fresh/chilled/frozen	4.0
058	Fruit preserved/fruit preparations	3.9
059	Fruit/vegetable juices	9.6
05712	Mandarins etc fresh/dried	1.7

Wheat flour has a RCA index value of 33. Grains from Pakistan, particularly wheat, also have strong comparative advantage in Afghanistan as indicated by RCA index values in the high teens and twenties. Although the RCA index value of 2.0 for rice indicates comparative advantage, the value is an order of magnitude smaller than that for other grains, reflecting preferences of the Afghan population that consumes mostly wheat. Milk powder is another product with a very high comparative advantage. Strong revealed comparative advantage is also evident in a range of processed products including butter and cheese, fruit/vegetable juices, preserved fruits and fruit preparations.

INDIA

India is a huge potential market where Pakistan enjoys a transportation cost advantage. The figures in Table 8 indicate the products with the strongest revealed comparative advantage: these include dates, vegetables and fruits (especially oranges). Exports of fruit and vegetable juices to India have shown a growing revealed comparative advantage since 2004.

TABLE 8

RCA with India

SITC code	Product category	RCA
023	Butter and cheese	1.9
025	Eggs, albumin	3.1
041	Wheat/meslin[1]	9.9
054	Vegetables, fresh/chilled/frozen	26.0
057	Fruit/nuts, fresh/dried	30.2
059	Fruit/vegetable juices	2.4
05711	Oranges, fresh or dried	14.8
05796	Dates, fresh/dried	90.4

[1]The RCA index value for wheat is based on a one-time export in 2007.

IRAN

Rice exports provide a degree of stability to the otherwise rather erratic pattern of Pakistani exports to Iran (Table 9). Over the past decade, the RCA index for rice has been consistently high with an average of around 9, indicating strong revealed comparative advantage of Pakistani rice in Iran.

TABLE 9

RCA with Iran

SITC code	Product category	RCA
042	Rice	9.1
048	Cereal etc flour/starch	1.2
054	Vegetables, fresh/chilled/frozen	5.6
057	Fruit/nuts, fresh/dried	2.0
059	Fruit/vegetable juices	4.8
05712	Mandarins etc fresh/dried	7.0
05797	Avocado/mango/guava fresh	1.5

Even though Pakistani vegetables also exhibit revealed comparative advantage in the Iranian market, the year-to-year pattern is highly variable. The same holds for fruit juices and fresh or dried fruits/nuts. The Iranian citrus market has opened up for Pakistani exports only recently. RCA index values for mandarin (*Kinnow*) were in excess of 10 during 2006-08 although the average for the past decade was 7.0. However, the risk of instability cannot be ruled out even in this category. For example, in early 2009 Iran raised import duties on *Kinnow* mandarins even though this increase was undone later that same year.

CHINA

Meat offal (SITC code 017) is the only agricultural product from Pakistan whose exports to China are significant as indicated by a RCA index value of 11.6. Even though the aromatic long-grain Basmati rice is a key export product from Pakistan to many countries throughout the world, it does not have market in China due to different preferences among Chinese rice consumers. Vegetables also have limited potential because China is not only the world's largest producer and consumer of vegetables but also a large exporter. Pakistan may want to explore the prospects of mango exports to China. Pakistani mangoes have done well in high income markets in western countries and also in Brunei. There may well be good potential for Pakistani mangoes for developing a niche in the Chinese market.

V. TOP EXPORT MARKETS FOR SELECTED PRODUCTS

This section identifies export markets for selected Pakistani agricultural products where revealed comparative advantage exists. The selected products

include mangoes, *Kinnow* mandarins, and dates. For the purpose of market identification, two filtering criteria were employed. First, the selected markets have an average RCA greater than one during the period 1999-2008. Second, Pakistan has exported the product in question to the specific market during six or more years during that same period.

MANGOES

Mango exports from Pakistan exhibit strong revealed comparative advantage in Oman, Saudi Arabia, United Arab Emirates and Brunei. The value of the RCA index for mango for the Oman market is 15 and in the remaining three markets it ranges between 5 and (nearly) 7. In addition there are several other Middle Eastern markets where RCA index values are high. An interesting aspect of mango exports is their penetration into European markets. The RCA index value is 3.7 for Norway, 2.9 for Switzerland, and 2.8 for the UK. Pakistani exporters may want to team up with major supermarket chains in these countries to further increase their market share.

TABLE 10

RCA of Mango in Different Markets

Market	No. of years exported during 1999-2008	Mean RCA
Oman	10	15.0
Saudi Arabia	10	6.8
United Arab Emirates	10	5.9
Brunei	8	5.5
Bahrain	10	4.4
Qatar	10	4.1
Norway	10	3.7
Maldives	10	3.6
Switzerland	10	2.9
United Kingdom	10	2.8
Kuwait	10	2.6
Singapore	10	2.0
Malaysia	10	1.0

KINNOW MANDARINS

The top markets for Pakistani *Kinnow* mandarins have been the Philippines and Indonesia with RCA index values of 39.2 and 25.0, respectively (Table 11). However, exports values to the Philippine market and the resulting RCA index values have been rather variable during the latter part of the 1999-2008 period.

Table 11

RCA of *Kinnow* Mandarins in Different Markets

Market	No. of years exported during 1999-2008	Mean RCA
Philippines	10	39.2
Indonesia	10	25.0
Singapore	10	8.3
Iran, Islamic Republic	8	7.0
Sri Lanka	10	6.3
Malaysia	10	3.6
Bahrain	10	3.4
Saudi Arabia	10	3.0
Mauritius	10	2.9
United Arab Emirates	10	2.7
Romania	6	2.3
Afghanistan	10	1.7
Oman	9	1.3
Kuwait	10	1.2

The next tier of important markets for mandarins would include Singapore, Sri Lanka, and Iran where average RCA index ranged from 6.0 to 8.0. The Iranian market opened up only in 2006 and has a tremendous potential for future development. On the other hand, the comparative advantage of Pakistani mandarins in the Singaporean, Sri Lankan and also the Malaysia markets has eroded somewhat in the second half of the 1999-2008 period. The factors that are responsible for this decline in export

performance are not quite clear and need to be identified through further research.

DATES

India is the largest importer of Pakistani dates. The transportation cost advantage and strong demand translate into an overwhelming revealed comparative advantage (RCA index value of 90) for Pakistani dates in India (Table 12). Although the size of the Nepali market is small compared to the Indian market, relative export performance of Pakistani dates there has also been quite strong. Pakistani dates also have revealed comparative advantage in Denmark where export performance has been quite consistent in recent years. Pakistan exports dates to Paraguay but the performance in that market has been rather unstable.

TABLE 12

RCA of Dates in Different Markets

Market	No. of years exported during 1999-2008	Mean RCA
Denmark	10	1.2
India	10	90.4
Maldives	7	1.1
Nepal	9	31.0
Paraguay	6	2.0

VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Given its relatively fertile soils, diversity of agro-ecological conditions and significant water resources from the Indus Basin, Pakistan is widely believed to be underperforming as far as its agricultural export potential is concerned. However, analyses to support this allegation are very few, in part due to the lack of easily accessible data. In this paper we provide the first necessary step in the analysis of Pakistan's comparative advantage in agricultural export markets. We use an index of Revealed Comparative Advantage that incorporates spatial dimensions to determine the competitiveness of selected agricultural products in overseas export markets. Unlike many other studies that analyze comparative advantage only at the world level, we were able to

access detailed data from the IMF that allowed us to determine the degree of Pakistan's agricultural competitiveness for disaggregated products in specific export markets. The earlier analysis had suggested that at the world market level Pakistan has a comparative advantage in cereals (especially rice) and horticultural products but not in livestock products. However, once specific markets and individual products are considered, the picture becomes considerably more nuanced.

Whereas relatively low yields in wheat and cotton combined with poor public policies towards these crops limit their export performance, Pakistan has traditionally been a significant player in the world rice market. However, even the relatively high value of the RCA index for rice is to a significant degree attributable to the fact that rice trades in a thin international export market. More efforts may be made to further strengthen the revealed comparative advantage in rice by brand name marketing, better quality control, measures of economic diplomacy (with a possible role of Pakistan's embassies) and by teaming up super-market chains aimed at increasing market access for Pakistan's Basmati rice variety in high-end markets in Europe and North America.

Our analysis suggests that there is considerable scope for further strengthening Pakistan's already considerable revealed comparative advantage in mandarin (*Kinnow*). Adoption of improved agronomic practices, control of citrus diseases, and targeted trade promotion campaigns in East-Asian and Central Asian markets can help. Development of seedless varieties of *Kinnow* and diversification into other citrus varieties (*e.g.* Clementine) with a view to penetrate the high-end citrus markets should be a medium term policy objective. Pakistan should also capitalize on the recently opened up Iranian market for mandarins. A measure of economic diplomacy would be needed to ensure that exports are not disrupted by sudden changes in import duties and other taxes in the importing country.

Besides fresh fruits exports, there exists considerable potential for increasing exports of processed citrus products. The citrus processing industry in Pakistan, while highly export oriented, is currently limited to grading, polishing and packing. In order to capitalize on the potential, there is need for developing a wide range of processed citrus products, including *Kinnow* juice and pulp, and by-products such as citrus peel oil. But serious quality control issues have to be addressed before the citrus processing industry diversification can be achieved. At present, the lowest quality *Kinnow* fruits are used for making juice, which is sold in the domestic market. This type of juice and other products of similar quality cannot be

exported and there is a need to upgrade this industry before exports can be successful.

The relative export performance of mango is quite strong. Adoption of "good agricultural practice" protocols and subsequent certification by importers would help enhance export performance further. High quality mangoes should be marketed more aggressively in high-end markets; for example, Pakistan has high quality mangoes that may find a niche in Chinese fruit market if appropriate market development efforts are made. Better quality control and adherence to SPS protocols along with more aggressive marketing could provide opening for Pakistani mangoes in the US market. Choice brands of high quality mango nectar could also be developed as niche products for certain export markets.

Dates typically found in arid regions are produced in all provinces of Pakistan and the country also has strong demonstrated comparative in their export. Dissemination of post harvest technologies among farmers in remote date-growing regions, and investments in modern processing and packaging facilities can help leverage this advantage. Pakistan may also try to expand the range of marketed date products.

Other fruits such as apples, peaches, grapes etc that are grown in Balochistan and NWFP have much weaker export performance. Access to modern marketing channels would seem essential for improving export volumes of these products.

Even though Pakistan has a revealed comparative advantage in vegetable exports, most of these exports go to neighbouring countries which represent mostly low-value markets. There already exists some vegetable cultivation in tunnels in Pakistan but most of this production is sold during the off-season in domestic markets. However, there is a need for investigating the prospects for exporting these vegetables during the off-season in overseas import markets.

Improved post harvest technologies and better cool chain infrastructure are needed to address perishability issues that currently limit the scope for exports of vegetables to more distant markets. Penetration into high-income developed country markets also requires mainstreaming good agricultural practices, certification and traceability. The traditional wholesale marketing system where produce is sold in the local *Mandi* markets before exports take place makes traceability virtually impossible. Institutional innovation that involves contract farming by, or on behalf of, exporting firms may help to resolve marketing obstacles.

Dairy products are another area of weak relative export performance. This is mainly caused by the predominance of traditional marketing channels that make quality assurance difficult, low milk yields from inadequately fed and mostly non-descript breeds of animals, and high domestic demand. The dairy processing sector is mostly inward-looking and where it does export (*e.g.* to Afghanistan) the main export product is UHT milk. In other words the industry currently seems to overlook the potential for exporting a wider range of dairy products (*e.g.* butter and cheese, and milk powder). But for this to happen there is a need for technical improvements in the milk processing sector. On the other hand, relatively small quantities of cheese produced in Pakistan have made an inroad into high-income countries such as the USA and Europe which demonstrates the potential of moving up the processing chain.

Analysis of bilateral and regional trading patterns reveals that processed products have relatively better prospects for penetrating high-income markets. These are precisely the products that use inputs acquired through non-traditional marketing channels. In the dairy sector, these channels are typically operated by large commercial dairy firms. But the product quantities that move through them are a very small proportion of total output. Expanding the coverage of non-traditional channels requires investments in cool chain infrastructure – preferably under public private partnership modalities – and improving the efficiency of private dairy firms so that they could sell more to middle income strata in urban areas.

With the exception of some limited exports to the Gulf, meat products are another area of weak export performance. Although domestic demand for meat is high, the real impediment to meat exports are SPS concerns: Pakistan needs to improve/upgrade its abattoirs and establish cold chains. Most importantly, it needs to invest in animal health services to ensure a disease-free livestock population, in research for improving livestock's genetic pool and for improving fodder varieties.

Trade with neighbours offers quite good prospects for enhancing agricultural exports. Afghanistan is an important market for a very wide range of Pakistani agricultural products. This market has potential to absorb exports from nascent Pakistani processing industry especially in the dairy processing sector. Indian market needs to be further exploited, which would require greater degree of normalcy in relations with that country. In addition to dates, vegetables, and processed products, revealed comparative advantage in orange exports to India, a citrus variety other than mandarin, offers possibilities for moving away from the near-monoculture in citrus

production, as well as for diversification of citrus exports. Pakistan needs to aim for achieving greater stability in export performance *vis-à-vis* Iran by better quality assurance, adherence to SPS requirements, and economic diplomacy. Penetrating the Chinese market represents a challenge for Pakistani exporters because the country is a large and highly diversified producer of agricultural products; the type rice the Chinese consumers favour is different for Pakistan's signature Basmati variety; and Chinese population concentration is greater on its eastern coast which is at considerable distance from Pakistan's land borders. Nevertheless, high quality mangoes and mango nectar exports, supported with aggressive marketing efforts, have prospects for penetrating the Chinese market. Focusing marketing efforts on areas neighbouring Pakistan, such as Sinkiang province of China may also pay dividends.

Finally, it must be stressed that this study is just a first step; more in-depth and market-and product-specific research will be needed to determine the specific investments and policy measures needed to increase Pakistan's competitive advantage in promising export markets and expand its market share.

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IMPACT OF EXCHANGE RATE VOLATILITY ON FOREIGN DIRECT INVESTMENT
A Case Study of Pakistan

SAMI ULLAH, SYED ZEESHAN HAIDER
and PARVEZ AZIM*

Abstract. The main objective of this study is to investigate the relationship of Foreign Direct Investment (FDI) with exchange rate and exchange rate volatility. The set of the determinants of FDI can be very large but exchange rate is one of the profound determinants. Nonetheless, exchange rates have become extremely volatile due to its fragility to adapt to the changes in domestic and international financial markets. In this study, time series data have been used for foreign direct investment, exchange rate, exchange rate volatility, trade openness and inflation from 1980-2010 for Pakistan. After collection of data on above stated variables, different time series econometrics techniques (unit root test, volatility analysis, cointegration technique and causality analysis) have been applied for the purpose of analysis. The results squeezed from the study demonstrate that FDI is positively associated with Rupee depreciation and exchange rate volatility deters FDI. Trade openness dramatically increases FDI while the premise doesn't hold for inflation as it is insignificant. The results of Granger causality test suggested that exchange rate volatility granger causes foreign direct investment but not *vice versa*.

Keywords: Exchange rate volatility, Foreign direct investment, Time series analysis

JEL classification: C22, E44, F21

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*The authors are, respectively, Lecturer in Economics, University of Gujrat, Gujrat; Graduate Student of Economics, University of Gujrat, Gujrat; and Dean, Faculty of Arts and Social Sciences, GC University, Faisalabad (Pakistan).
Corresponding author e-mail: samigcu@yahoo.com

I. INTRODUCTION

Foreign Direct Investment is the metaphorical form of investment that is reshaping the world of finance as its volume is soaring with vengeance for the past two decades. Attracting FDI is the most plausible rhetoric of the policy makers especially in developing countries. Highly mobile capital amid globalization strengthens the role of the most novel form of investment, *i.e.* FDI. Developing countries are usually trapped in the vicious circle of poverty and it becomes seemingly impossible for them to break this wicked circle. FDI in this context is pivotal as it supplements the domestic capital to attain the critical minimum investment to break the vicious circle of poverty. Developing economies are facing shortage of capital thus they are racing with each other to attract more and more of FDI.

In many emerging economies, foreign capital plays an important role in infrastructure development, technological advancement and productivity enhancement. Developing countries can also manipulate these funds to stimulate positive growth externalities. Moreover, FDI to developing countries is also beneficial for both developed and developing countries because the marginal productivity of capital in developing countries is high due to its shortage and investors from developed countries seek high profits. This double coincidence of wants escalates the gains from international capital movement.

Foreign direct investment has gotten tremendous upsurge in 1990s throughout the world and particularly in developing countries. In the previous decade, sky-rocketing momentum of FDI has made it the largest source of foreign capital for developing countries. Developing countries received $ 561 billion direct investment in 2010. The first phase of rising FDI began in 1990 then the inertia broke in 2002 where FDI inflows reached a trough. From 2003-2007, FDI reached at its peak with an astronomical momentum. Developing countries are aggressively looking for foreign capital to fulfill their obligations to the Millennium Development Goals (MDGs). FDI to developing countries started a tremendous upsurge from 2002. International investment boom started in 2004; enabled the world to witness the unprecedented level of FDI which astoundingly touched $ 1.9 trillion in 2007. Due to financial crisis of 2007, world FDI inflows decline by 11.5% followed by a more abrupt fall of 32% in 2008 and 2009 respectively. However, FDI inflows showed a mild recovery of 4.9% in 2010. Khan and Kim (1999) pointed out the crucial importance of FDI for Pakistan in order to boast industrial production and manage its fragile balance of payment position. Pakistan stands at 51st position out of 82 countries on the basis of

2007-2011 average FDI inflows and FDI of Pakistan contributes 0.19% to the world total (*Economist Intelligence Unit*). In Pakistan; FDI as percentage of GDP remained below 1% before 1995. The share of FDI started increasing in 2003 and reached 5% peak in 2008. In the recent years, it fell substantially. Domestic political and security situation are the main drivers of this negative trend along with gloomy investment prospects throughout the world.

Exchange rates have profound and far-reaching implications for the economy and its crucial importance in determining the competiveness of the economy is unquestionable. Nonetheless, exchange rates have become very sensitive to small changes in domestic and international economic scenario and show frequent changes. Especially in the short run, exchange rates are observed to overshoot their long run equilibrium level as investors reallocate their financial assets to achieve a new balanced portfolio in response to any change in interest rates, expectations, wealth etc. This stock of financial assets is very large as accumulated over a long period of time so the adjustment in financial stocks is surprisingly bigger and quicker than the adjustment in trade flows. The response rate of real sector is not as fast as that of the financial sector. So in the short run, exchange rates are more likely to reflect the effect of financial asset adjustments. Caporale *et al.* (2009) suggested that external, real and monetary shocks are responsible for exchange rate volatility in emerging countries with international financial integration as the main driving force therefore financial integration and economic liberalization should be pursued steadily in developing countries. Since 1973, from the collapse of Bretton woods system, exchange rates of various countries have been fluctuating frequently. These wayward movements of FDI stimulate uncertainty which puts the investor in dilemma of how to interpret these changes. Investors; in an indecisive mode may postpone the investment which results in reduction of FDI. Therefore, it is important to find out whether there exist a robust relationship between FDI and exchange rate volatility of Pakistan. Froot and Stein (1991) presented the relative wealth effect hypothesis of exchange rates. Increase in exchange rate increases the relative wealth of host country investors which results in boom of FDI inflows. Inflation is used as an indicator of the quality of macroeconomic management so the conceivable relationship between FDI and inflation is negative. Whereas; FDI is expected to be positively linked with trade openness which is commonly used proxy of the degree of openness of the economy in the empirical research.

II. LITERATURE REVIEW

Udomkergmogkol and Morrisey (2009) worked on the nexus of exchange rates and FDI. The results indicate that devaluation attracts while volatility in local currency depresses FDI. H-P filter approach is used to assess volatility. Increase in real effective exchange rate is interpreted as expected devaluation thus postpones FDI.

Brzozowski (2003) used Fixed Effects OLS and GMM Arellano-Bond model to examine the impact of exchange rate uncertainty on FDI for 32 countries. GARCH (1,1) method was utilized to measure volatility which had been detected to be negatively influencing the FDI. Barrell *et al.* (2003) explored the effect of exchange rate volatility on US FDI in Europe and UK by employing generalized method of moments (GMM) on panel of seven industries from 1982-1998. They found strong negative relation between US FDI and exchange rate volatility in Europe and UK. Another study on the impact of G-3 exchange rate volatility on outward FDI by Gerardo and Felipe (2002) reveals that stability in exchange rate is necessary to improve FDI. Annual data from 1975-1998 has been used by categorizing countries into different geographical regions. Exchange rate volatility was found to be negatively associated with the FDI to developing countries.

Furceri and Borelli (2008) suggested that the effect of exchange rate volatility on FDI depends on country's degree of openness. Exchange rate volatility has a positive or null effect on FDI for relatively closed economies but has a negative effect on economies with high level of openness. Bouoiyour and Rey (2005) sort out with annual data from 1960-2000 that volatility captured using standard deviation and misalignments of real effective exchange rate have no effect on the FDI to Morocco.

Tokunbo and Lloyd **(**2009) empirically investigated the impact of exchange rate volatility on inward FDI of Nigeria. Using cointegration and error correction techniques, they confirmed positive relationship between recipient currency depreciation and FDI inflows while exchange rate volatility has no deterministic effect which is incorporated through standard deviation of exchange rate. Jie Qin (2000) in a theoretical examination found a positive relation between exchange rate volatility and two-way FDI in an economy of one sector and two countries. This paper analyzes exchange rate risk as an incentive to materialize two-way FDI for risk diversification.

Goldberg and Kolstad (1994) enlightened by quarterly data that volatility of exchange rate acts as a catalyst for MNE's in internationalizing their production facilities. The optimally located country productive capacity

increases with the increase in volatility without decrease in domestic investment in US, Canada, Japan and UK. Aizenman (1992) sort out the influence of exchange rate regimes on domestic and foreign investment dynamics. The correlation between investment and volatility of exchange rate is destined to be negative or positive depending on the nature of exchange rate regime. According to his study, in flexible exchange rate country correlation will be positive if the shocks are real and negative if the shocks are nominal.

Impact of surging Chinese FDI inflows on Asian economies was explored by Nimesh (2009). Panel data of 11 Asian host economies from 1989-2004 is employed with the help of Arellano Bond and Instrumental variables estimations. Market size, infrastructure, openness and exchange rate volatility are the variables used in the study. Exchange rate volatility turned out with strong explanatory powers. Volatility of exchange rate had negative impact on FDI from US.

Rashid and Fazal (2010) investigated the outcomes of capital inflows for Pakistan by applying linear and non-linear cointegration on monthly data from 1990-2007. The results indicate monetary expansion and inflation due to capital inflows. Capital inflows are also fuelling exchange rate volatility. Becker and Hall (2003) found that R&D foreign direct investment tends to readjust from Europe to UK because of Euro-Dollar exchange rate volatility by exploiting GMM. GARCH is used to capture volatility. Long-term interest rates, output fluctuations are among other significant variables.

Arbatli (2011) has undertaken a multidimensional study on the determinants of FDI. He incorporated both global push factors and country specific pull factors including macroeconomic and institutional variables. The data sample consists of 46 countries from 1990-2009. Fixed or managed floating exchange rate regime was found to be more conductive for FDI as freely floating regime is more prone to risk.

III. METHODOLOGY AND DATA

The variables used in the study are FDI, exchange rate, exchange rate volatility, trade openness and inflation. Sample covers yearly data from 1980-2010 for Pakistan. Data has been extracted from World Bank's reliable data source World Development Indicators (WDI). All the variables have been used in log form which makes interpretation more robust and meaningful and inflationary effect has been isolated by dividing it with GDP deflator (on the basis of 2000). Volatility is measured by ARCH/GARCH techniques (Engle, 1982; Bollerslev, 1986). Different time series

econometric techniques are utilized to fulfill our objectives which include Cointegration and Vector Error Correction Mechanism (VECM). Finally Granger Causality Test is employed to check for causality.

Unit Root

Almost all the economic variables are non-stationary at their level form which makes the coefficients inconsistent and empirical results spurious. Ground making information about whether stochastic processes follow unit root phenomenon can be obtained by simply plotting the variables and making corellograms. These are the informal ways to check for unit root process. More rigorous methods are Phillips-Perron Test (PP) and Augmented Dickey Fuller Test (ADF) which is broader version of Dickey Fuller Test and also counteracts the problem of the serial correlation of error terms which is violation of the key assumption of its paternal Dickey Fuller Test.

Considering a simple AR(1) process

$$Y_t + \rho Y_{t-1} + \eta X_t + \mu_t \tag{1}$$

Where Y_t depicting a time series variable and X_t is a vector of independent variables, ρ and η are the parameters of Y_t and X_t respectively which are to be estimated and μ_t is the white noise error term with zero mean and constant variance. If $\rho = 1$ then the equation (1) becomes random walk model confirming unit root.

Subtracting Y_{t-1} from both sides:

$$\Delta Y_t = \beta Y_{t-1} + \eta X_t + \mu_t \tag{2}$$

Where Δ is difference and $\beta = \rho - 1$. In practice equation (2) is estimated to see whether $\beta = 0$ or not. If $\beta = 0$, it means in turn that $\rho = 1$ and our variable follows unit root process. Thus Dickey Fuller statistic tests Null Hypothesis H_0: $\beta = 0$ ($\rho = 1$) through ordinary least square (OLS) estimation under the critical values of tau statistic. If this null hypothesis is accepted it means our variable is non-stationary and its variance is increasing function of time.

But a sufficient condition for Dickey Fuller is that the error terms must not be serially correlated. In case of such violation, Augmented Dickey fuller (ADF) can be a remedy. It augments the contemporary DF equation with lagged values of dependent variable. Assuming that Y_t follows AR(p) process, it incorporates p lagged terms of regressand in the equation (2).

$$\Delta Y_t = \beta Y_{t-1} + \eta X_t + \sum_{k=1}^{p} \delta \Delta Y_{t-k} + \varepsilon_t$$

Cointegration

Engle and Granger (1987) revolutionized the traditional view of time series econometrics by stating that even if two or more time series are non-stationary, linear relationship among them can be stationary. Cointegration is basically the long-run or equilibrium relationship among different random variables. If two or more series are non-stationary and integrated of the same order then there can be a long-run stationary relationship among them. Such series are said to be cointegrated and the resulting OLS regression is called cointegrating regression leading to super consistent coefficients.

Given a simple equation

$$Y_t = \alpha + \beta X_t + \mu_t \tag{3}$$

Where Y_t and X_t are non-stationary series [I(1)], α, β are parameters and μ_t is the stochastic disturbance term.

Now subtracting from the random disturbance term

$$\mu_t = Y_t - \alpha - \beta X_t$$

If these error terms stationary [I(0)], it means that there exists a long-run linear combination among series, hence they are cointegrated.

When cointegration among different time series exists, Error Correction Mechanism (ECM) is used to capture short-run dynamics. If two or more series are cointegrated then ECM reconciles the short-run relationship with long-run behaviour of the variable. Engle and Granger (1987) stated that cointegrating variables must have an Error Correction Mechanism.

$$\Delta Y_t = \gamma + \delta \Delta Y_t + \theta \mu_{t-1} + e_t$$

Here Δ is the first difference operator, e_t is the stochastic error term and μ_{t-1} is the lagged value of the error term from cointegrating equation (3) which explicitly indicate that ΔY_t is also depending on μ_{t-1} along with ΔX_t .We augment the difference form of the equation with the first period lag of the cointegrating equation error term. If θ is non-zero, it means that the model is having disequilibrium. In case, θ is statistically significant and having negative sign, we say that the model is converging towards

equilibrium. Absolute value of θ determines the magnitude of the movement to restore equilibrium.

Granger Causality Test

Granger (1969) developed Granger Causality test to evaluate the direction of relationship. If a variable X_t is granger causing Y_t then the changes in X_t are preceding changes in Y_t. Thus, if X_t is included in regression of Y_t on its own and other variables lags, it helps to boost the forecasting of Y_t. This is precisely what Granger Causality test determines whether one variable is useful in forecasting other or not.

Given the equations

$$Y_t = \alpha + \sum_{i=1}^{k} \phi_i Y_{t-i} + \sum_{i=1}^{k} \gamma_i X_{t-i} + \mu_{1t}$$

$$X_t = \alpha + \sum_{i=1}^{k} \beta_i Y_{t-i} + \sum_{i=1}^{k} \vartheta_i X_{t-i} + \mu_{2t}$$

The null hypotheses which are tested are:

H_0: $Y_i = 0$, $i = 1, 2, 3, \ldots. k$; significance of this hypothesis means that X_t doesn't granger cause Y_t.

H_0: $\beta_i = 0$, $i = 1, 2, 3, \ldots. k$; significance of this hypothesis means that Y_t doesn't granger cause X_t.

Two variables are independent of each other if none of the hypothesis is rejected. It means neither X_t causes Yt nor Y_t causes X_t. If mere one hypothesis is rejected it means that there is one-way causality whereas if both hypotheses are rejected, it shows bidirectional relationship.

Vector Error Correction Mechanism

If we add the first period lag of the error term of the cointegrating equation in the difference form of the Vector Autoregressive model (VAR) that becomes Vector Error Correction Mechanism (VECM).

Given the VAR equations

$$Y_t = \alpha + \sum_{i=1}^{k} \beta_i Y_{t-i} + \sum_{i=1}^{k} \gamma_i X_{t-i} + \mu_{1t}$$

$$Y_t = \alpha + \sum_{i=1}^{k} \beta_i Y_{t-i} + \sum_{i=1}^{k} \gamma_i X_{t-i} + \mu_{2t}$$

If we augment difference form of these equations with the lagged error term; we get VECM. At first, we run the simple VAR and find out the most plausible lag length on the basis of lag selection criteria using Akaike Information (AIC) or Schwartz Bayesian (SBC) criterion. The minimum value of AIC or SBC guides us to the appropriate lag length. Then we estimate following equations of VECM:

$$\Delta Y_t = \alpha + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + \sum_{i=1}^{k} \gamma_i \Delta X_{t-i} + \sigma_1 e_{1t-1} + \mu_{1t}$$

$$\Delta Y_t = \alpha + \sum_{i=1}^{k} \beta_i \Delta Y_{t-i} + \sum_{i=1}^{k} \gamma_i \Delta X_{t-i} + \sigma_2 e_{2t-1} + \mu_{2t}$$

Volatility measurement ARCH/GARCH

Instead of using traditional unconditional measures of volatility which are naive approaches such as standard deviation and coefficient of variation, we focus on conditional volatility. Autoregressive Conditional Hetroscedasticity (Engle, 1982) and Generalized Autoregressive Conditional Hetroscedasticity (Bollerslev, 1986) come in handy for this. Engle (1982) stated that unconditional measures of volatility ignore the information regarding the random process of the generation of exchange rates. These naive measures capture fluctuations but not uncertainty. ARCH and its variants are corrective developments to solve such problems and also to incorporate the phenomenon of volatility clustering. The time varying variance of the error term in ARCH is conditional on the past values of the series.

Given a random walk phenomenon without drift

$$Y_t = Y_{t-1} + \mu_t \tag{4}$$

Where Y_t is a variable which depends on its lagged value and a white noise error term (mean = 0, variance = σ^2).

Taking first difference of equation (4):

$$Y_t - Y_{t-1} = \mu_t$$

$$\Delta Y_t = \mu_t \tag{5}$$

Equation (5) exhibits that Time series Y_t is stationary at its first difference. Estimation problem in modeling these first differences is that they exhibit wide swings. Their variance is a hyper varying function of time. Engel (1982) devise a technique ARCH to model such fluctuating variance.

In ARCH, the conditional variance of error term (μ_t) depends on the squared previous error terms.

$$Var(\mu_t) = \sigma_t^2 = \alpha_0 + \alpha_1 \mu_{t-1}^2 + \alpha_2 \mu_{t-2}^2 + \cdots + \alpha_p \mu_{t-p}^2$$

The above model is an example of ARCH(p) model. The hypothesis we test is

H_0: $\alpha_1 = \alpha_2 = \ldots. \alpha_p = 0$; if the hypothesis is accepted and we have $Var(\mu_t) = \alpha_0$, it means that there is no autocorrelation and there is no ARCH effect.

GARCH model is as

$$\sigma_t^2 = \alpha_0 + \alpha_1 \mu_{t-1}^2 + \alpha_2 \sigma_{t-1}^2$$

Where, conditional variance of error term (σ_t^2) at time t depends on squared error term (μ_{t-1}^2) in the previous time period and also on the previous lag of the conditional variance (σ_{t-1}^2). The sum of α_1 and α_2 measures the persistence of volatility. This model is GARCH (1, 1) and it can be generalized to GARCH(p, q).

IV. RESULTS AND DISCUSSIONS

Unit root analysis has been done to get familiarize with the nature of data. As expected in case of most of the economic time series, all the variables in our

TABLE 1

Unit Root Test Results

Variables	Level		First difference	
	Test Statistic	Critical Value	Test Statistic	Critical Value
Log (RFDI)	–2.367429	–2.954021	–7.582403	–2.957110
Log (TOP)	–2.996129	–3.540328	–5.991824	–3.544284
Log (INF)	–2.753911	–3.557759	–6.443919	–3.544284
Log (ER)	–1.751163	–3.540328	–4.331213	–3.544284
Log (VOLT)	3.646663	–2.948404	–3.343577	–2.951125

All the variables for Pakistan are stationary at on first difference at 5% level of significance.

study are non-stationary. Augmented Dickey Fuller (ADF) test has been applied to check for the unit root. ADF test verified that all the variables are non-stationary in their level form but their first difference is stationary at 5% level of significance. The results are presented in Table 1 which show that the variables in our study are I(1).

Volatility series is constructed through GARCH (*p, q*) technique and GARCH (1, 1) model is chosen on the basis of AIC and SBC. Minimum value of AIC and SBC indicates the significance of the model in explaining hetroscedasticity. All types of volatility modeling has been done in EViews 6.0 but for convenience only best fitted model on the basis of minimized AIC and SBC criteria is presented in Table 2.

TABLE 2

Estimated Coefficients of Exchange Rate Volatility for Pakistan

GARCH (1, 1)		
	Coefficient	ρ-value
Mean Equation		
C	–0.504134	0.2186
ER(–1)	1.094624	0.0000
Variance Equation		
C	–0.153496	0.1640
RESID(–1)^2	–0.129071	0.6492
GARCH(–1)	1.447420	0.0002
Akaike Info Criterion	3.623586	
Schwartz Bayes Criterion	3.843519	

The next step is checking for cointegration which is applied through Johansen and Jeselius (1990). Trace statistics and Eigen values are the two criteria used to check for cointegration. Both trace and Max-Eigen statistics confirm the existence of two cointegrating equations for foreign direct investment, exchange rate, exchange rate volatility, inflation and trade openness at 1% level of significance. The results are presented in Table 3.

TABLE 3

Cointegrating Trace Statistic and Eigen Values for Pakistan

Null Alternative	$r = 0$ $r \geq 1$	$r \leq 1$ $r \geq 2$	$r \leq 2$ $r \geq 3$	$r \leq 3$ $r \geq 4$	$r \leq 4$ $r \geq 5$
Trace Statistics	120.5661	65.51088	27.71318	10.41992	0.218787
Eigen value	0.830681	0.704557	0.427560	0.280406	0.007033
Critical value	69.81889	47.85613	29.79707	15.49471	3.841466
Probability	0.0000	0.0005	0.0854	0.2498	0.6400

LRFDI = 4.789878 + 0.608511 LER – 0.054358 VOLT + 0.101711 LINF + 4.632142 LTOP
(0.11263) (0.01469) (0.10352) (0.67052)
[5.87797] [–3.70139] [0.90303] [6.90826]

The equation shows that exchange rate has a positive relationship with real FDI and it increases by 0.608511 units because of 1 unit increase in exchange rate. This positive relationship is in uniformity with Froot and Stein (1991), Blonigen (1997), Udomkergmogkol and Morrisey (2009) and Tokunbo and Lloyd (2009). Coefficient of LER is statistically significant at 1% level of significance as t-statistic is considerably greater than 2. Whereas, volatility of exchange rate is impacting Real FDI negatively. Gerardo and Felipe (2002), Brzozowski (2003), Barrell *et al.* (2003), Kun-Ming-Cheng *et al.* (2006), Dumludag (2007) and Udomkergmogkol and Morrisey (2009) have found the same direction of relationship. A unit increase in exchange rate volatility reduces Real FDI of Pakistan by 0.054358 units. Coefficient of VOLT is highly significant at 1% level of significance as t-statistic is greater than 2. Inflation and trade openness have a positive effect on Real FDI but coefficient of inflation is insignificant. One unit increase in Inflation and Trade openness causes real FDI to rise by 0.101711 units and 4.632142 units respectively. Coefficient of trade openness is significant at 1% level of significance. The magnitude of the influence of trade openness on FDI inflows is tremendous. Arbatli (2011), Cevis and Camurdan (2007) have also confirmed a profound positive effect of trade openness on foreign direct investment. The intercept of the cointegrating equation has the value 4.8 implying that real FDI would still be positive if all the explanatory variables set equal to zero. The signs of all variables are according to the priori expectations except inflation which is statistically insignificant. Exchange rate, exchange rate volatility and trade openness are statistically significant at 1% level of significance.

Now we apply Pairwise Granger Causality test. Granger Causality test is used to determine whether one variable is capable of predicting another variable. The p-value less than 0.05 correspond to the rejection of null hypothesis at 5% level of significance. Results for Granger Causality test are presented in Table 5.

TABLE 5

Granger Causality Test for Pakistan

Null Hypothesis	F-Statistic	Probability
LER does not Granger Cause LRFDI	3.40298	0.0750
LRFDI does not Granger Cause LER	4.30654	0.0466
VOLT does not Granger Cause LRFDI	4.41854	0.0441
LRFDI does not Granger Cause VOLT	0.87662	0.3566
LTOP does not Granger Cause LRFDI	0.10506	0.7481
LRFDI does not Granger Cause LTOP	3.99327	0.0548
LINF does not Granger Cause LRFDI	0.00886	0.9256
LRFDI does not Granger Cause LINF	0.00045	0.9833
VOLT does not Granger Cause LER	1.56771	0.2196
LER does not Granger Cause VOLT	0.74488	0.3945
LTOP does not Granger Cause LER	3.12137	0.0865
LER does not Granger Cause LTOP	0.00104	0.9745
LINF does not Granger Cause LER	0.02408	0.8776
LER does not Granger Cause LINF	0.62016	0.4366
LTOP does not Granger Cause VOLT	1.18703	0.2841
VOLT does not Granger Cause LTOP	0.02691	0.8707
LINF does not Granger Cause VOLT	4.45475	0.0427
VOLT does not Granger Cause LINF	2.27985	0.1409
LINF does not Granger Cause LTOP	0.50525	0.4822
LTOP does not Granger Cause LINF	0.00028	0.9868

Results show that exchange rate volatility granger cause Real FDI at 5% level of significance but not vice versa. While exchange rate granger cause real FDI at 10 % level of significance and Real FDI granger cause exchange rate at 5% level of significance. Inflation also granger cause volatility. Trade openness granger cause exchange rate while foreign direct investment

granger cause trade openness at 10% level of significance. FDI does not granger cause exchange rate volatility which is contrary to the view that FDI exacerbates exchange rate volatility.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

The estimation framework reveals that foreign direct investment in Pakistan increases with the depreciation of the Rupee (Rs.). FDI of Pakistan increases by 0.61 units in response to 1 unit increase in exchange rate. Depreciation of Rupee is taken as an incentive by the foreign investors and they are attracted to invest in Pakistan because of their relative increase in worth of their assets. Pakistan is following freely floating exchange rate system since 2000 which makes country more sensitive to the slight variations in the foreign exchange market. Exchange rate volatility acts like a market friction for FDI in Pakistan as evident by our results. Future prone to risk and uncertainty provoked by exchange rate volatility hampers FDI in Pakistan. But its effect is quite small as compared to effect of exchange rate appreciation. A unit increase in volatility of exchange rate depresses FDI by 0.054358 units which is still noticeable.

Inflation is affecting FDI positively in our model contrary to conventional wisdom but it is highly insignificant. Trade openness is magnificently explaining the variations in FDI of Pakistan. It is obvious from its coefficient that liberalization of the Pakistan's economy is a pivotal factor that encourages FDI. The coefficient value of trade openness is 4.632 making it the largest contributor to increase in FDI in our model. 1 unit increase in trade openness causes Real FDI to increase by 4.632 units.

Finally, Granger Causality test confirms that there exist a unidirectional relationship between foreign direct investment and exchange rate volatility. Volatility of exchange rate granger cause foreign direct investment. FDI doesn't seem to galvanize exchange rate volatility. Inflation also granger cause exchange rate volatility. Though, inflation is insignificant in our model to explain FDI but it granger cause volatility thus pointing that it may have an indirect negative effect on FDI via volatility.

Pakistan is a developing country which is in dire need of foreign investment to stimulate domestic economy, seek new technology, modern managerial skills and employment generation for ever increasing population. Foreign Direct Investment in this regard can play a decisive role not only to manage difficult economic conditions but it also promotes competition in the economy which brings efficiency leading to the beauty of capitalism;

innovation. Our policy recommendation is to minimize the exchange rate volatility and to keep exchange rates in a compatible mode. Any such movement in the exchange rates that leads to the loss of competitiveness should be avoided by proper planning and well regulated foreign exchange market. Economic liberalization with stable exchange rate should be promoted in order to bring fresh FDI by revising the exchange controls and developing modern financial markets.

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'FARM SIZE – PRODUCTIVITY' RELATIONSHIP
Recent Evidence from Central Punjab

MAQBOOL H. SIAL, SHAHID IQBAL and A. D. SHEIKH*

Abstract. The main goal of this study is to test and evaluate the existence of 'inverse farm size – productivity' hypothesis based on a random sample of 302 farmers from six districts of central Punjab of Pakistan. The study is designed to evaluate the productivity status of small and large farm categories based on their output and resources allocation. In this regard, econometric analysis is performed on small and large farms for four major cash crops. This study confirms the inverse farm size and productivity relationship in the sample area, though relative use of inputs and resulting output differ along farm size.

Keywords: Farm size, Productivity, Inverse relationship, Small and large farms

JEL classification: Q12, Q15, Q16

I. INTRODUCTION

In development economics, an ongoing debate on farm size and productivity inverse relationship (IR) exists. It is argued that small farms are more efficient as these can use more efficiently resources like family labour with enhanced capability to closely monitor their production activities. Sen (1962) is the first to discover that productivity per acre decreased with increase in size of holding in India. He found empirical evidence regarding small farmers' relative superiority with regard to per unit land productivity over large farmers largely based on aggregated data. Subsequently, he gave

*The authors are, respectively, Professor/Dean, Faculty of Management and Administrative Sciences, Graduate Student, and Visiting Professor at the Department of Economics, University of Sargodha, Sargodha (Pakistan).
Corresponding author e-mail: maqsial@yahoo.com

technique-based, labour-based, and fertility-based three alternative lines of explanation for this phenomenon. However, the statistical validity of the 'inverse relation' has been challenged in early 1970s by his contemporaries in the region, who based on analysis of dis-aggregated data relating to individual holdings, came up with results contradicting the hypothesis that yield per acre falls as farm size increases (Fan, 2003; Sridhar, 2007). It resulted in commencement of debate among researchers of various regions in the world. In the next two decades, rapid movement of industrialization in Asian countries resulted in urbanization led to demand for labour from rural areas; small labour intensive farms are reckoned as a major obstacle in this process as. In addition, the availability of cheaper modern inputs like fertilizer, pesticides, farm machinery etc. that reduced the labour demand rapidly in the peak seasons, small size farms became less productive when accounted for the opportunity cost of labour. Hence, with the advent of the Green Revolution, researchers showed that the inverse relationship between farm size and land productivity is diminished or even reversed, as agriculture becomes more capital intensive. Therefore, there is an appeal for larger size of farm in the 1970s and 1980s started in these countries (Helfand, 2003; Rios and Shively 2005).

In the last decade of twentieth century, "the small is beautiful" view once again started to gain importance. In 1980s, agricultural production had become more diversified into high value commodities. Old cropping patterns had improved, for example, from cereals to cash crop, from crop to horticultural and livestock products, in which small farms again started to gain comparative advantages over the large farms. Furthermore, big farms are input (fertilizer, pesticides, weedcide, etc.) intensive that led to the degradation of their natural resource. Considering these externalities, large farms are no longer in lead in productivity and efficiency as compared to small farms.

An analysis of cost structure, production practices and output may help in identifying the constraints faced by the farming community in increasing their farm incomes. In face of the scarcity of farmland and constraints of extensive farming, the significance of increasing productivity may not be taken too lightly. Higher agricultural productivity will lead to quicker growth, rural jobs and resources for industrial progress along with food supply to ever-increasing population. This study aims to evaluate an economic relationship between farm size and productivity and to identify structural and technological differences between small and large farmers based on resource endowments, productivity and profitability. The results of this study would be quite beneficial in shedding some light on various

policies relating to agrarian structure, access to credit, prices and subsidies. While the results of study would mainly be applicable for the farming community of the central area of the Punjab province, the generalization of the results could be relaxed, perhaps, to the overall farming community of Punjab.

SCOPE OF THE RESEARCH

According to 1990 World Agricultural Census (FAO, 2001), average farm size was 1.6 hectares in both Africa and Asia, which showed the dominance of small forms in the region. In Africa, the average size of land holdings decreased from 1.5 hectares in 1970 to 0.5 hectares in 1990. In China, the average size of land holdings decreased from 0.56 hectares in 1980 to 0.4 hectares in 1999 (Fan and Chan-Kang, 2003); in Pakistan, it steadily declined from 5.3 hectares in 1971-73 to 3.1 hectares in 2000, consequently, the number of small farms rose to more than triple during the period.

Pakistan's agriculture has many features among which the magnitude of the farm size is the most important. Over the past few decades, the farm size has decreased mainly due to inheritance and transfer. The growing increase in the number farms might be due to combine effect of institutional, technological and demographic factors.

About 94.47 percent of the total 5.07 million farms have an area of less than 12.5 acres while only 5.53 percent of the total farms have an area of more than or equal to 12.5 acres in Pakistan. While in case of Punjab, out of the total 3.86 million farms with total farm area of 27.83 million acres, small farms constitute about 85 percent of the total farms accounting for 47 percent of total farm area. Whereas, only 0.58 million farms have an area greater than or equal to 12.5 acres accounting for about 53 percent of total farm area. Above 50 present rural populations in Pakistan is landless while 2.5 percent big farmers have one third of agricultural farms exceed 50 acres (Gop, 2004). The area covered in this survey consists six districts situated a little above the center of Pakistan' Punjab, which is thickly populated area. The results of the study can easily be applied to situation of whole Punjab.

SAMPLE

The data are collected from 302 farmers of six districts Sialkot, Gujranwala, Sheikhupura, Faisalabad, Jhang and Toba Tek Singh using random sampling technique on a pretested questionnaire; 184 small and 118 large farmers for the 2005-06 cropping year. Farmers with land holdings < 12.5 acres are treated as small farmers while those with land holdings ≥ 12.5 acres as large farmers.

II. LITERATURE REVIEW

Over the last few decades, the policy debate on the choice of agrarian structure and performance of small versus large farms led to creation of vast literature based on data from South Asia, Latin America and Africa. In most of these countries, the agrarian structures are such that the distribution of land is highly skewed toward large farms. Although the inverse relationship between farm size and land productivity had been found in various countries, the literature has focused mainly in India. We present an appraisal of empirical evidence on the farm size-productivity relationship and try to evaluate the causes that may clarify the lack of consensus on this debate.

Sen (1975) proposed a theory of agricultural dualism, where the 'traditional' small-scale peasant sector is supposed to be gifted with abundant family labour with almost zero opportunity cost, while confronting an acute shortage of capital. Whereas large-scale 'modern' or 'capitalist' sector depends on more costly hired labour and has good access to credit which amounts to former relatively labour-intensive and the later relatively capital-intensive. Hence, inverse relationship established a basic argument for redistribution of land, which tended to alleviate inequality in the agricultural holdings across farmers, which might improve efficiency and rural growth (Lipton, 1993). The same argument can explain the determinants of rural-urban migration called push factors that are poverty, landlessness and joblessness in the rural areas.

The opinion that large farms benefited unduly from the green revolution might be triggered initially by quicker adoption of the technology by the large farmers due to their better capacity and access to capital inputs. However, once the paybacks of the new techniques had been established, the small farmers equally utilized them (Goldman and Smith, 1995). Empirically, it has been demonstrated that the inverse relationship cannot exist not due to factors like labour market imperfections, diminishing returns to scale etc., which are generally considered less vulnerable but due to intertemporal price risk. The alternative explanation is based on three empirical facts that are common characteristics of low-income agriculture. First, farmers could not fully evade uncertain staple crop prices through futures contracts or by forward sales before the commencement of the crop at the time, they make decision about inputs allocation. Such decisions are made as they are risk averse with regard to both income and consumer prices. Second, land distribution among agricultural population is uneven and thus also the land endowments. Third, households' net agricultural purchases are also inversely related to farm size as small farmers are net

produce purchasers while large farmers are net sellers (Barrett, 1993). The well-established inverse farm size and productivity relationship is generally expounded in terms of decreasing returns and the existence of frictions in the land, capital, labour or insurance markets that inhibit the efficient allocation of land across farms. The analytics do not consider the potential significance of overlooked heterogeneity in farmers' expertise quality and self-selection through job-related choice. There is dire need to demonstrate a discrete choice consumption function that may decide, at a given level of endowment assuming constant returns, skillful peasants are expected more to become farmers than unskillful peasants. Even in the nonexistence of decreasing returns, a differential explanation for the inverse relationship using endogenous work-related choice and disparities of farming skills can be provided empirically (Ghatak and Assunc, 2003). Thus, the opportunity cost of a skillful peasant to turn into a wage worker is reckoned as very high.

Farm size is usually considered the physical size of land held in operation. It has been proved that a regression equation leads to biased estimates and mistakenly leads to an inference that there had been diseconomies of scale in land use, when conventional definition of size of a farm is used as measure of form size (Sampath, 1992). It happens, when the total operational area is dichotomized in the analysis into irrigated and no irrigated land, because of implicit assumption that a unit of irrigated piece of land had the identical cropping intensity potential than a unit of no irrigated piece of land. Using the similar type of dataset, Fan (2003) demonstrated that there were no diseconomies of scale in use of land when the operational holding is dichotomized into irrigated and no irrigated land in the econometric model. Therefore, this led to further examining the relationship between various structure of land size and various variables on the soybean productivity among owner-operated and share cropper-operated farms. Primary data for Madhya Pradesh for the 1999 rainy season crop was used and productivity of owner-operated and trial farms was found higher than sharecropped farms. The celebrated inverse-relationship was found again for both owner-operated (r = 0.27) and share cropper-operated (r = 0.30) farms (Wani *et al.*, 2006).

In the recent past, the evidence was found again in models that allow and do not allow for village dummies (as cluster controls), the fraction of irrigated land (as proxy for land worth) and socio-economic characteristics — households caste, education, size of family etc., as proxy for access to capital. The socio-economic variables were unable to support the evidence (*i.e.* whether the relationship was due to variation in regions or access to capital). The overall result supported, in the household data drawn from a

survey from Nepalese mid hills, perhaps due to more use of other inputs by small farms rather than diseconomies of scale[1] (Sridhar, 2007).

With the help of more sophisticated, less restrictive, more informative, more powerful than alternative methods and newly developed Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA) techniques came into practice for technical and cost efficiency and productivity measurement with advent of new century. These efficiency techniques adopted by researchers, started to demonstrate differentiated results according to different condition and assumptions imposed on the parameters of production function. Contrastingly, while surveying the farms in two districts of Dak Lak Province to study the technical and cost efficiency of small coffee farms in Vietnam, Rios and Shively (2005) found that small farmers were less efficient than big farmers. In a two-step analysis, measuring technical and cost efficiency by DEA and then running Tobit regressions to find factors correlated with technical and cost inefficiencies, they observed that small farms emerge partly inefficient to investments in irrigation infrastructure. For a group of Honduran farms, diminishing returns to scale renders smaller farms more economically efficient overall, despite the relative technical efficiency of larger farms using DEA (Gilligan, 1998). Helfand (2003) demonstrated a pioneering result, while studying determinants of relationship between technical efficiency and farm sizes using DEA, that the relationship between farm size and efficiency was not linear but a quadratic parabola — with productivity first dropping and then increasing with size. He also found that access to institutions, credit, and modern inputs etc. were key factors responsible for the differences in efficiency across farms and concluded that improvement in these factors could reinforce the efficiency improvement of small and medium size farms.

As, mentioned earlier, some of the previous studies have shown that small farmers are more efficient and productive than large ones. Using 'inverse farm size – productivity relationship' as the basis, it has been argued that land reforms that would pave the way for more equitable distribution ought to be adopted to help agriculture utilize its full potential in terms of higher output, larger income and wider employment. Yet, there are others studies arguing that the 'inverse farm size – productivity relationship' does not exist anymore or has reversed over time, primarily due to the adoption of perched inputs and labour replacing farm machinery. Differences in productivity and structure of agriculture under heterogeneous conditions are

[1]As the application of Cobb-Douglas (CD) technology found constant returns to scale.

quite evident. However, production variability within narrow limits on farms under homogeneous conditions may also be there due to variation in resource endowment, technology and structure. Nevertheless, how much large should be the range of variation, is a matter of concern. The factors responsible for variation in productivity on small and large farms thus need to be investigated in a comprehensive manner. In any case, whether an inverse relationship still prevails or absent is an empirical question that can be settled only with recent data sets.

III. RESEARCH HYPOTHESES

For studying the superiority of comprehensive income to net income for firm performance, we test the following hypotheses:

H_1: The relationship between Gross farm income per farm per acre in Rs. and Value of family labour, Cost of hired labour, land, Capital inputs, per farm in Rs. is significant.

H_2: There are no structural and technological differences between small and large farms.

H_3: The relationship between the value of production per acre and the acres of operational holding was significantly negative.

H_4: The relationship between the value of production per acre and the acres of canal irrigated operational land holding is significantly negative.

H_5: The relationship between the value of production per acre and the acres of tubewell irrigated operational land holding is significantly negative.

IV. RESEARCH METHOD

LABOUR COSTS

Data regarding labour and payments to casual hired labour allocated to each crop are collected. For family labour, opportunity cost of family labour was taken equal to the earnings of a permanent hired labour according to the prevailing rates. The cost of permanent hired labour was estimated by adding the amount paid in cash, value of wages paid in kind, value of food provided, and value of clothes, tobacco and fodder as well as the value of other miscellaneous payments paid by the landlord.

CAPITAL INPUT COSTS

Capital inputs include the charge for relatively fixed inputs like draught animals, hand tools, farm machinery and equipment: For draught animals, the interest and depreciation on the capital value of draught animals is used to estimate their cost. The cost of farm machinery and implements, in case of ownership, includes the capital cost and depreciation on investment plus fuel cost, labour cost and repair and maintenance.

CASH INPUT COSTS

Cash inputs include the relatively variable inputs with respect to crop and season. These include seed, manure, fertilizer, payments to artisans, land revenue, water rates, and hired farm machinery. For home produced seed and manures, the prevailing price at the time of sowing and actual amount spent on purchased seed and manure are used. For fertilizers, the market price plus transportation and application cost for each crop are used. For land revenue and water rates, the actual amount paid to the Government of concerned crop is taken into account. The cost of hired farm machinery and implements is the value paid for hiring them.

LAND INPUT COST (LAND RENT)

Land rent based on duration of the crop (market basis) is calculated by the formula used by Manan (2001) as under:

$$RPA_i = \frac{AR}{TCM} \times NMC_i$$

Where

RPA_i = Rent per acre for the i^{th} crop.

AR = Average rent prevailing in the village of one acre for a year.

NMC_i = Number of months the i^{th} crop is in the field.

TCM = Total crop month on the farm, calculated as under.

$$TCM = \sum_{i=1}^{n} A_i DCM_i$$

Where

A_i = Area under the i^{th} crop.

DCM_i = Duration of the i^{th} crop in months.

MODEL SPECIFICATION AND H_1 TESTING

To evaluate the variability between small and large farm categories, following function is developed for the pooled data:

$$\ln Y = \alpha_0 + \beta_1 \ln (\text{FAM}) + \beta_2 \mu \ln (\text{RVL}) + \beta_3 \ln (\text{CASH}) + \beta_4 \ln (\text{CAP}) + \beta_5 \ln (\text{HIRL}) + \mu \quad (1)$$

Where

ln = Natural logarithm

Y = Gross farm income per farm per acre in Rs.

FAM = Value of family labour per farm in Rs.

RVL = Rental value of land per farm in Rs.

CASH = Cash inputs per farm in Rs.

CAP = Capital inputs per farm in Rs

HIRL = Cost of hired labour per farm in Rs.

μ = Error term

α, βs = Parameters of the model

For comparison and testing of structural and technological differences, separate functions for small and large farm groups are also estimated using Chow's F-test and its value is computed by the following formula:

$$F^* = \frac{\dfrac{S_p^2 - \left(S_S^2 + S_i^2\right)}{K}}{\dfrac{\left(S_S^2 + S_i^2\right)}{\left(N_S + N_1 - K\right)}}$$

Where

F^* = Calculated value of Chow's F.

S_p^2 = Pooled residual sum of square.

S_S^2 = Residual sum of square for small farms.

S_i^2 = Residual sum of square for large farms.

N_S = Number of small farms.

N_1 = Number of large farms.

K = Number of parameters.

The hypothesis tested is H_2:

H_0: Regressions for small and large farmers are statistically same. Against.

H_2: Regressions for small and large farmers are not same, *i.e.* there are no structural and technological differences between small and large farms statistically.

H_3 TESTING RELATING FARM SIZE AND PRODUCTIVITY

To test farm size productivity relationship following simple regression is applied as used by Heltberg (1996):

$$Y = \gamma_1 \log (\text{OPHOLD}) + e_i \quad (2)$$

Where Y is the value of production per acre and OPHOLD is the acres of operational holding.

TESTING H_4 AND H_5 RELATING FARM SIZE AND PRODUCTIVITY WITH MODE OF IRRIGATION

To facilitate the results of the analysis equation (2) is also relaxed to account for the canal irrigated and tubewell-irrigated area as well, *i.e.*

$$Y = \delta_2 \log (\text{OPCANIR}_i) + \delta_2 \log (\text{OPTWIRR}_i) + \varepsilon_i \quad (3)$$

Where OPCANIR and OPTWIRR are the acres of canal irrigated and tubewell-irrigated land operated respectively while ε_i is the error term.

THE OTHER TESTS: ESTIMATION OF GROSS MARGIN, PRIVATE PROFITABILITY MARGIN AND COEFFICIENT OF PRIVATE PROFITABILITY

To know the variability between the two farm categories, in terms of profitability for each group, gross margin, private profitability margin (PPM) and coefficient of private profitability (CPP) are estimated. Gross margin is helpful in comparing the efficiency of farms in the short run and it is calculated by deducting the variable cost from gross income. Private profitability margin shows the profit or loss in absolute terms and it is calculated by subtracting the total cost from gross income. Similarly, the co-efficient of private profitability shows the profit or loss in relative terms. It is obtained by dividing the gross income by the total cost. Its value above 1.00 shows the product is profitable for the farmer to produce while the value below 1.00 indicates lack of profitability.

SOURCE OF DATA

The data are collected from 302 farmers of six districts Sialkot, Gujranwala, Sheikhupura, Faisalabad, Jhang and Toba Tek Singh using random sample on a pretested questionnaire. Information about socio-economic

characteristics, cultural practices, input use and various outputs is collected and various cost items involved in the farm enterprise are estimated as under.

V. RESULTS AND DISCUSSIONS

SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

Table 1 portrays the socio-economic and general characteristics of the respondents of the study area. It is evident that there is significant variability in most of the characteristics between the two 'farm categories except for the age, land use intensity, and percentage of the farmers using only Canal water for irrigation purpose.

TABLE 1

Socio-economic Characteristics of the Respondents of the Study Area

General Characteristics	Small	Large	All
Age (years)	45.10	43.53	44.48
Education (Schooling years)	5.63	7.64	6.41
Family labour units/cultivated acre	0.39	0.13	0.29
Permanent hired labour (No./acre)	0.02	0.02	0.02
Farm Characteristics			
Operational land holdings (acres)	6.48	30.13	15.72
Land use intensity (%)	96.34	87.60	92.92
C,'opping intensity (%)	181.58	176.99	179.79
Livestock inventory (AA U/CA*)	0.84	0.51	0.71
Tenancy status (percent Farmers)			
Owner (%)	47.68	21.85	69.54
Owner-cum-tenant (%)	10.26	13.91	24.17
Tenant (%)	2.98	3.31	6.29
Power source (percent Farms)			
Own tractor	9.60	20.20	29.80
Hired tractor	35.43	13.25	48.68
Hired tractor + bullocks	4.97	5.96	10.93
Irrigation source (percent Farms)			
Canal	4.03	3.36	7.38
Canal + Tubewell	25.50	18.21	43.71
Tubewell	22.52	13.25	35.76

*Adult Animal Units/Cultivated acre.

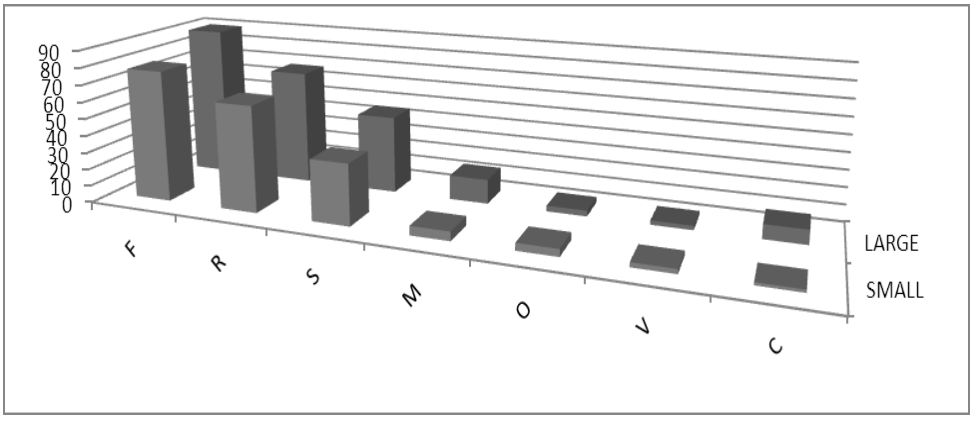
CROPPING PATTERN AND LAND ALLOCATION

1. Kharif Cropping Pattern

Kharif crops sown are cotton, sugarcane, rice, maize, vegetables, fodder, and kharif others like til (sesame) etc. About 4.3 percent of the total farmers are growing cotton, allocating an average area of 4.71 acres, which is 0.77 percent of the culturable area. About 40 percent farmers are growing sugarcane on an average area of 5.32 acres, which is 15 percent of the culturable area while about 65 percent farmers are growing rice on an average area of 11.50 acres, which is 42 percent of the culturable area. About 4 percent farmers are growing vegetables on an average area of 2.31. Similarly about 9 percent of the total farmers are growing maize on an average area of 6.20 acres of operational land. Others like til (sesame) etc. is grown by 4 percent of the farmers on an average area of 2.58 acres. About 82 percent farmers grew kharif fodder on an average area of 2.64 acres, which is 18 percent of the culturable area. There is a significant variation in the frequency of the farmers and their allocation of land to various crops by small and large farmers (Figures 1 and 2). In all cases, the number of small farmers growing kharif crops is less than that of large farmers, as is the case with land allocation to various crops, however, the percentage of the cropped area to the total operational area is relatively less for large farmers except for cotton.

FIGURE 1

Percentage of the Farmers Growing Kharif[2] Crops
According to Farm Size Groups



[2]Where C = cotton, F = fodder, M = maize, O = other, R = rice, S = sugarcane, V = vegetables.

FIGURE 2

Percent Operational Area under Kharif Crops
According to Farm size groups

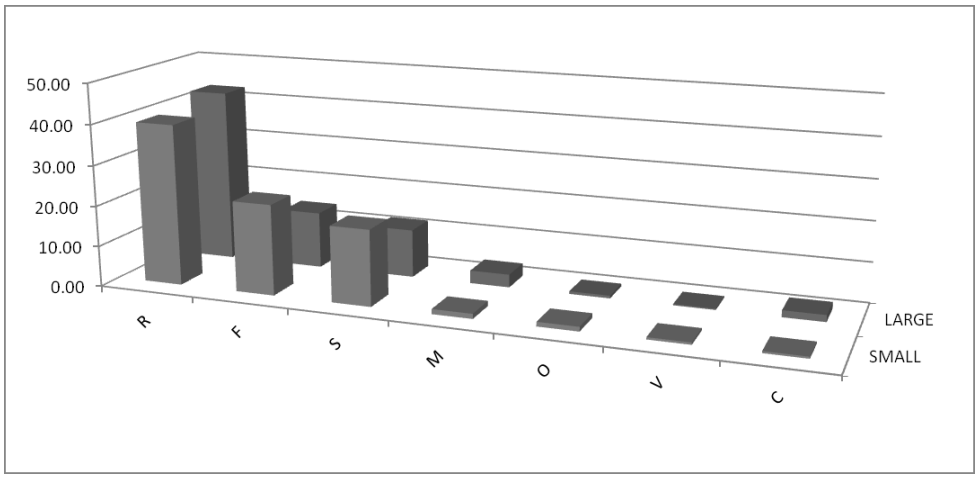
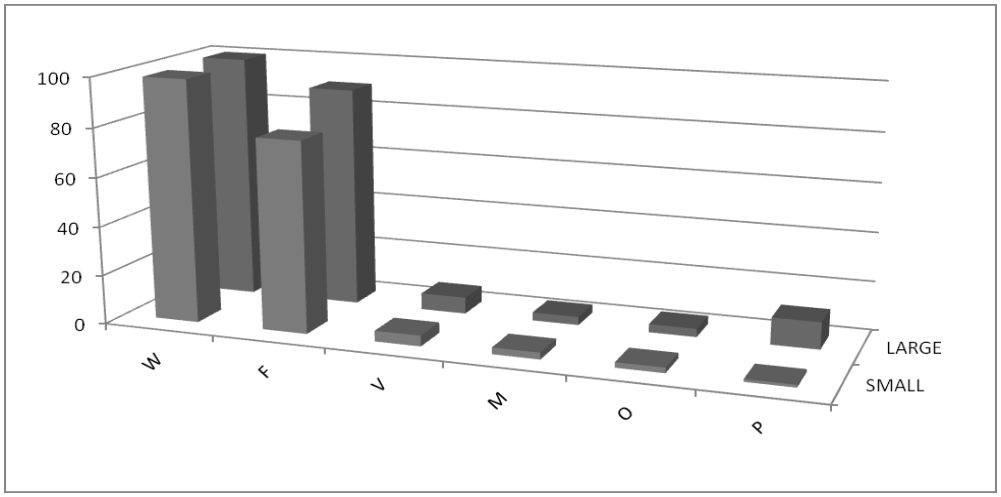


FIGURE 3

Percentage of the Farmers Growing Rabi[3] Crops
According to Farm Size Groups



2. Rabi Cropping Pattern

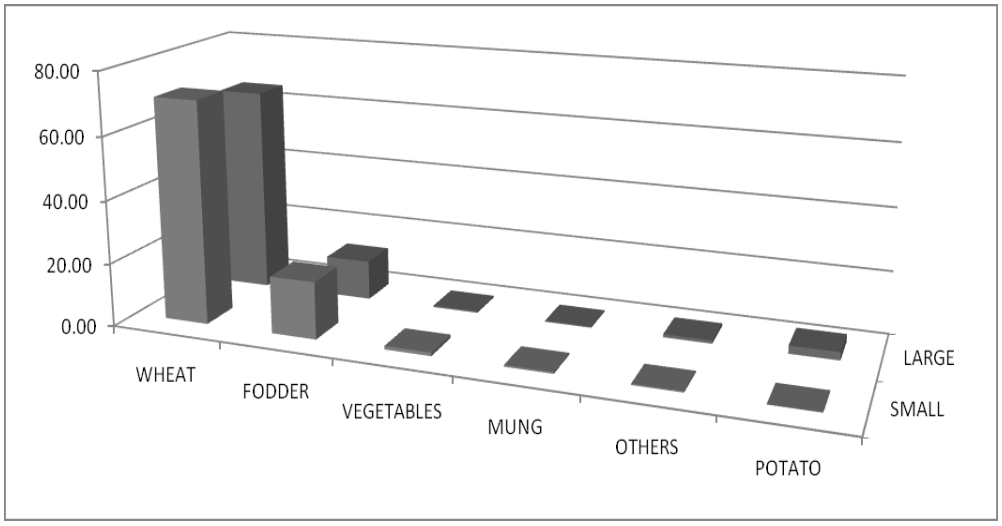
About all the farmers are growing wheat on their farms and they allocated a larger proportion of cultivated area to wheat crop. Small farmers allocated

[3]Where F = fodder, M = mung, O = other, P = potato, V = vegetables, W = Wheat

about 71 percent of their operational area to wheat crop while all of the large farmers are growing wheat and they allocated about 65 percent of their operational area to this crop. A minor percentage of the large farmers also grew others like grams etc. Similar trend is found in case of some Rabi vegetables and potato. Nearly 83 percent of the total farmers grew berseem or other Rabi fodders on about 15 percent of their land holdings; large farmers allocating more land than the smaller ones. The percentage of the large farmers is more as compared to small farmers, as is the case for area under Rabi fodders (Figures 3 and 4).

FIGURE 4

Percent Operational Area under Rabi Crops
Relative to Farm Size Groups



3. Value of Output per acre and Farm Size Productivity Relationship

Value of output per cultivated acre differed along the farm size categories. There is an appreciable variation in the value of output on per acre basis between small and large farmers for the whole sample as well as on district basis during a cropping year (Table 2). It is clear that small farmers are not getting more per acre due indivisibilities of capital inputs. Taking the overall sample results, large farmers are getting about 1.3 percent higher put-put per operated acre. Table 3 provides an ample insight to develop a relationship between farm size and output per unit area, *i.e.* productivity. Similarly, the results depicted in Table 3 show an inverse relationship between farm size and productivity as value of output declined with increase in farm size. These results quite conform to the findings of Heltberg (1996).

TABLE 2

Value of Output per Acre in the Study Area

Districts and Type	Value of output per cultivated acre (Rs.)		
	Small	Large	All
Sialkot	33958.88	38163.30	35575.96
Gujranwala	35382.40	43998.87	37967.32
Shaikhupura	29877.27	33492.25	31612.48
Faisalabad	60224.16	57934.42	59674.62
Jhang	25194.68	30027.96	27374.37
Toba Tek Singh	32691.72	36647.54	34629.29
The Whole Sample (All 6 Districts)	37571.41	38071.69	37781.46

FIGURE 5

Value of Output per Acre in the Study Area

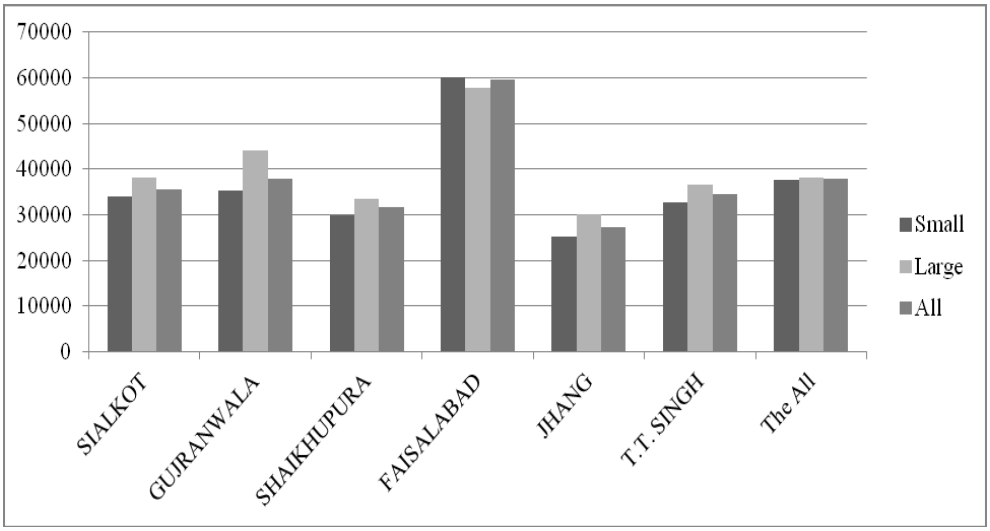


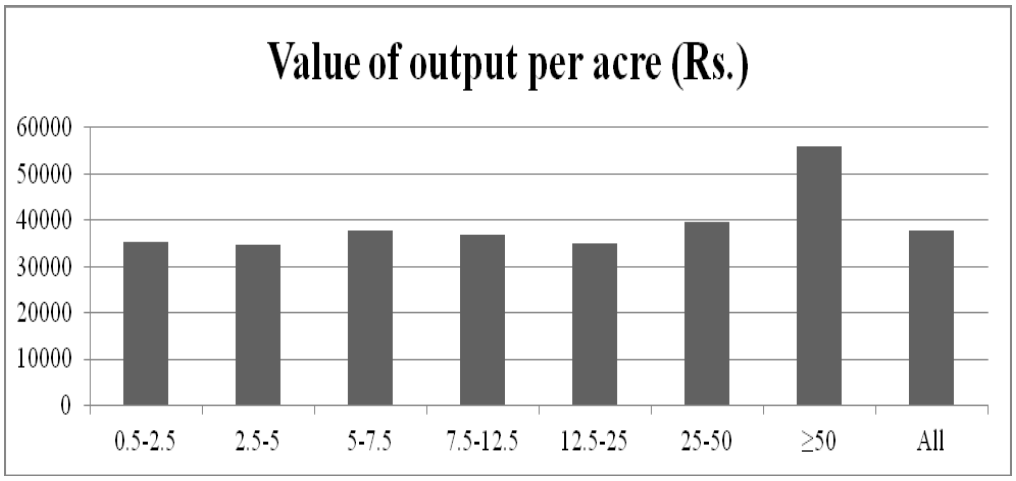
TABLE 3

Value of Output for Various Farm Groups in the Study Area

Total = 37781.5							
Farm groups (acres)	0.5-2.5	2.5-5	5-7.5	7.5-12.5	12.5-25	25-50	≥ 50
Value of output per acre (Rs.)	35242.8	34625.4	37749.0	36863.0	35099.2	39535.6	55914.7

FIGURE 6

Value of Output for Various Farm Groups in the Study Area



THE RESULTS OF HYPOTHESES (1) TESTING

Using pooled data for both small and large farmers, the function in equation (1) is estimated using OLS estimation procedure. Coefficient for family labour is positively related to total output but its contribution is minimal. The coefficients of family labour, hired labour and cash inputs are significant at 95 percent level of confidence and are positively related to output per farm per acre. The results are summarized in Table 4.

TABLE 4

Results of the Pooled Regression Analysis

Model	Coefficients	Std. Error	t-Statistic	P-Value
Constant	12.471	0.642	19.422	0.000
ln (FAM)	0.202	0.025	8.168	0.000
ln (RVL)	0.000	0.023	–0.013	0.990
ln (CASH)	0.089	0.024	3.697	0.000
ln (CAP)	–0.712	0.030	–24.006	0.000
ln (HlRL)	0.247	0.049	5.003	0.000
R^2 =	0.92	$\bar{R}^2$ =		0.91
Durbin-Watson Stat =	1.61	RSS =		8.19
F-Stat =	647.8			

The coefficient land value and capital inputs have negative relation with output. The capital inputs are strongly significant whereas land value is not significantly affecting the output. The coefficients of capital inputs and cash inputs are highly significant at even 99 percent level of significance but they have negative signs. Results of regressions for small and large farmers are appended in Tables 5 and 6.

TABLE 5

Regression Results for Small Farms

Model	Coefficients	Std. Error	t-Statistic	P-Value
Constant	11.324	0.858	13.201	0.000
ln (F AM)	0.271	0.027	10.141	0.000
ln (RVL)	–0.020	0.023	–0.879	0.381
ln (CASH)	–0.002	0.025	–0.073	0.942
ln (CAP)	–0.698	0.030	–23.110	0.000
ln (HIRL)	0.363	0.070	5.171	0.000
R^2 =	0.94	$\overline{R}^2$ =		0.94
Durbin-Watson Stat =	1.42	RSS =		2.73
F-Stat =	539.7			

TABLE 6

Regression Results for Large Farms

Model	Coefficients	Std. Error	t-Statistic	P-Value
Constant	11.502	0.806	14.273	0.000
ln (FAM)	0.178	0.033	5.433	0.000
ln (RVL)	0.017	0.033	0.503	0.616
ln (CASH)	0.126	0.033	3.774	0.000
ln (CAP)	–0.540	0.049	–11.019	0.000
ln (HIRL)	0.127	0.055	2.325	0.022
R^2 =	0.67	$\overline{R}^2$ =		0.66
Durbin-Watson Stat =	1.66	RSS =		2.68
F-Stat =	46.08			

THE RESULTS OF HYPOTHESES (2) TESTING, *i.e.* TESTING FOR STRUCTURAL AND TECHNOLOGICAL VARIABILITY, CHOW'S F-TEST APPROACH

To test the presence of structural and technological variability, equation 1 is estimated using pooled data for full sample. Then separate functions for small and large farms are estimated to test the variability using Chow's F-test approach. Regressions results for pooled data, small farms and large farms data are utilized in the Chow's F-test. The calculated value of F* is as under:

$$F^* = \frac{\dfrac{8.19-(2.73+2.68)}{6}}{\dfrac{2.73+2.68}{290}}$$

$$= \frac{[8.19-(2.73+2.68)](290)}{6(2.73+2.68)}$$

$$= 24.83^{**}$$

If α is fixed at the 5% level, the critical F^* (6,290) = 1 with p-value F^* dist (24.83, 6,290) = 000. Moreover, since the observed value of F^* is 24.83, null hypothesis can be rejected implying that the regressions for small and large farms are statistically not the same. Therefore, it can be concluded that the two farm groups are structurally and technologically different. This result is similar to some earlier results of Sharif *et al.* (1990) implying those small farmers are different in structure and technology to that of larger farmers.

THE RESULTS HYPOTHESES (3) TESTING RELATING FARM SIZE AND PRODUCTIVITY

Regressing value of output per unit of cultivated area against the log of operational holding confirmed a negative relationship between farm size and productivity. Further, this regression analysis is also relaxed to account for canal and tubewell irrigated area to know exact mechanism for both categories of land. The results of these regressions are provided in Tables 7 and 8.

It is evident from the results of the simple regression in Table 4 that there is an inverse relationship between farm size and productivity for full sample and it is significant at 95 percent confidence level. The negative coefficient suggests that productivity decreases with per unit increase in the operational area.

TABLE 7

Simple Regression of Output per Acre

For Variable LNOPHOLD	Sample	Cons-tant	Coeffi-cient	SE	P-Value	R^2
Sialkot	52	11.61	-0.55	0.03	0.00	0.87
Gujranwala	50	11.53	-0.52	0.04	0.00	0.78
Shaikhupura	50	11.60	-0.54	0.04	0.00	0.80
Faisalabad	50	11.60	-0.52	0.04	0.00	0.82
Jhang	51	11.61	-0.51	0.05	0.00	0.68
Toba Tek Singh	49	11.79	-0.50	0.05	0.00	0.69
Full Sample	302	11.62	-0.52	0.02	0.00	0.75

TABLE 8

Multiple Regression of Output per Acre for Full Sample

Variable	Constant	Coeffi-cient	SE	t-stat	P-Value
log (OPCANIR) $n = 108$, $R^2 = 0.79$	11.52	–0.51	0.03	–20.06	0.00
log (OPTWIRR) $n = 18$, $R^2 = 0.82$	11.75	–0.51	0.06	–8.57	0.00

THE RESULTS HYPOTHESES (4 AND 5) TESTING, *i.e.* RELATING FARM SIZE AND PRODUCTIVITY WITH MODE OF IRRIGATION

About similar sort of relationship is observed when accounting for canal and tubewell irrigated area. The coefficient for tubewell-irrigated area is stronger than that of canal-irrigated area (Table 5). It may be due to the fact that the underground water may be brackish or salty in nature. Moreover, the canal water is more benefiting in most of the cases than the tubewell water. Similarly, canal water is cheap and hence it reduces per acre cost of irrigation.

FARM SIZE AND PROFITABILITY

Gross margin, private profitability margin and coefficient of private profitability are estimated for major crops, mainly grown for commercial purpose, such as cotton, wheat, rice and sugarcane in order to determine and identify the most beneficial crops (Table 9).

TABLE 9

Gross Margins, Private Margins and Coefficient of Private Profitability

Crop	Farm Category		
	Small	Large	All
Gross Margin (Rs.)			
Wheat	3931.99	5083.93	4385.09
Cotton	4958.37	2478.00	3050.39
Rice	7292.80	9547.54	8217.82
Sugarcane	19832.33	17038.17	18574.96
Private Profitability Margin (Rs.)			
Wheat	2119.77	4694.27	3132.40
Cotton	-2802.73	613.725	-174.69
Rice	3467.77	8295.00	5448.17
Sugarcane	12616.20	14375.22	13407.75
Coefficient of Private Profitability			
Wheat	1.22	1.49	1.33
Cotton	1.66	1.40	1.46
Rice	1.37	1.75	1.53
Sugarcane	1.80	1.80	1.80

Coefficient of private profitability shows that cotton is not profitable to grow for both farm groups while sugarcane had greater profitability values for both farm categories. Wheat and rice had greater values of gross margin, private profitability margin and coefficient of private profitability for small farms whereas sugarcane and cotton had greater values in case of large farms.

VI. SUMMARY AND CONCLUDING REMARKS

Mean farm size of the overall sample of farmers is about 13.14 with small farmer having mean around 6.18 acres and large farmers having mean farm size about 23.85 acres with large farmers having about 386 percent more operational holdings than the small farmers. About 80 percent farmers used canal and tubewell water for irrigation while there are about 17 to 18 percent farmers who used only tubewell water for irrigation purposes. Family labour use is more on small farms than the large farms as the small farmers have surplus family labour and they employ relatively less hired labour. The land

use and cropping intensities are higher for small farms. About all the farmers did grow wheat, Rabi and Kharif fodders. There is some variation in the yields of major crops for the two categories of farms. Value of output of all products per acre during a year varied significantly among the farm size groups. Small farmers are getting about 18.6 percent higher output than large farmers from one acre indicating an inverse relationship between farm size and productivity. Using a log linear function, the presence of inverse relationship is confirmed when using value of output per acre as dependent variable and log of operational holding as independent variable. Gross Margin, Private Profitability Margin and Coefficient of Private Profitability for major crops indicated the absolute and relative profitability of maize, sugarcane, rice, wheat and cotton in the descending order. When tested for structural and technological variability using Chow's F-test, it is confirmed statistically that the two farm groups are not same and these have varying nature of size, structure, input use, output, technology, resources and profitability.

VII. RECOMMENDATIONS

Findings of this study leads to the following suggestions to minimize the structural, technological and profitability gaps between small and large farms and to improve the productivity of both farm categories:

1. Although a number of land reforms have been done in the last 60 years in area without any significant changes occurred because those affecting by the reforms immediately transferred land to their near ones to avoid land transfer to the poor. Furthermore, the reforms are not done in the province where the mostly large former existed in number. The distribution of farm size remains skewed even after the reforms. The core conclusion of the inverse relationship is redistribution of land by taking from inefficient large farmers and giving to efficient small former such that the overall welfare of population of the area is increased through overall increase in productivity.
2. In addition, large farms get easier access to credit and capital inputs relative to small farms. Therefore, the majority of small farmers should be facilitated with easy access of to the essential agriculture inputs and be able to avail agricultural credit and other benefits without any restriction and heavy paper work from one window so that they are able to meet their capital requirements in time.

3. As small farmers are more efficient in their farming activities and are resource poor and capital deficient, which imply that these farmers must be provided special subsidized capital inputs like fertilizers, farm machinery, pests, seeds etc. on priority basis.
4. The big farmers must also be trained by especial research/extension programmes in order to use their inputs more sensibly and become more economically efficient.
5. As cotton crop is found less profitable to grow, mainly due to heavy infestation of insect pests, the farmers of the study area are advised to grow disease and pest resistant varieties of cotton while there is also an option of growing some alternative crops like mungbean and maize.
6. Simple education of small and large farmer is necessary so that they may be able understand and benefit from agricultural training/extension programmes initiated by government/private agencies. Raising the literacy level is an essential for the success in productivity and farming efficiency.
7. The productivity of tubewell-irrigated area is found less than that of canal-irrigated area, indicating tube well irrigation costly and less fertile than canal water that contains mud. The underground water may be unfit for irrigation due to the presence of salts and a hardpan underneath the topsoil, therefore, laboratory test water and must be facilitated by authorities.
8. Exchange of international knowhow in farming technologies (*i.e.* efficient international farmer face to face meetings) especially with neighbouring (with less language problems) countries is necessary whose farmers' productivity/yield is significantly high, even if large farmers start first due to expenses reasons, tickle down effect will ultimately reach the small farmers.
9. Inappropriate fertilizer and pesticide use, inadequate availability of quality seed, inadequate markets infrastructure and non-availability of adequate and costly farm power may be addressed through integrated efforts of agri-business private firms, government agencies, research organizations and the cooperative farming itself.

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DEFENSE SPENDING-ECONOMIC GROWTH NEXUS: A CASE STUDY OF PAKISTAN

MUHAMMAD AZFAR ANWAR, ZAIN RAFIQUE and SALMAN AZAM JOIYA*

Abstract. Defense spending of Pakistan remains high in order to sustain a credible deterrence, significant geopolitical position in Afghan wars and combat terrorism. The present study analyzes the defense spending in light of perceived and real threats to Pakistan's security and its linkages with economic growth. By developing a theoretical framework to explore the different dimensions of relationship, the study empirically investigates the relationship between defense spending and economic growth. Econometric techniques such as Johansen Cointegration and Granger Causality tests have been applied to obtain empirical results by using a time series data from 1980 to 2010. The results indicate that there exists a long-run relationship between defense spending and economic growth whereas economic growth granger causes defense spending.

Keywords: Defense spending, Economic growth, Security of Pakistan

JEL classification: H56, H72, Q43, Q47

I. INTRODUCTION

Defense expenditure is professed as undesirable spending and burden on an economy because expenditure on defense diverts the resource allocation of that economy from development projects. Above and beyond this perception and criticism nation-states continue to add to their defense expenditures and to develop their military stockpile and take it as a primary duty of

*The authors are, respectively, Lecturer at COMSATS Institute of Information Technology, Vehari; M. Phil. (Government and Public Policy) Scholar at National Defence University, Islamabad; and Lecturer in Economics at the University of the Punjab, Lahore (Pakistan). Corresponding author e-mail: zee.azfar@gmail.com

governance for many reasons. According to Stockholm International Peace Research Institute (SIPRI), world military spendings have crossed the figure of $ 1.63 trillion in 2010, which shows a 1.3 percent increase in real terms from 2008 military spending and 50 percent increase since 2001. This can be thought by considering defense expenditure as a component of government spending which is used as a fiscal policy tool to correct short-run economic fluctuations explained by Military Keynesianism. It can be characterized as state's responsibility to pursue the goals of security and prosperity.

Pakistan is a poor country with a ranking of 156th in world per capita purchasing power parity (PPP) adjusted gross national income of $ 2,600, human develop index (HDI) ranking 125th, peace ranking 145th and stands 35th in defense spending ranking. Defense expenditure of Pakistan remains high and takes a large portion of gross domestic product (GDP) 4.5% on average from 1995 to 2009 due to longstanding conflicts and arms race with India and its geopolitical position in Afghan war and internal incidents of terrorism. These high defense spendings have attracted many researchers from within (Tahir and Sajid, 1999; Khilji and Mahmood, 1997) and outside the country (Henderson, 1993; Looney, 1998a; 1998b). There are economic effects of these expenditures and enough literature is available which shows the relationship between defense spending and economic growth and indicates the direction of this relationship. Recently there is a decline in defense spending from 6.4% in 1995 and 4.1% in 2000 to 3.1% of GDP in 2009.

The present study aims at finding out the determinants of high defense spending and to gauge the relationship between defense spending and economic growth in Pakistan. Keeping this in view, the paper has been organized on the following lines. Section II explains theoretical framework and literature review is given in section III. Section IV explores the dynamics of defense spending; section V presents methodology and data sources; section VI gives result; and section VII concludes the study. Lastly some recommendations are given in section VIII.

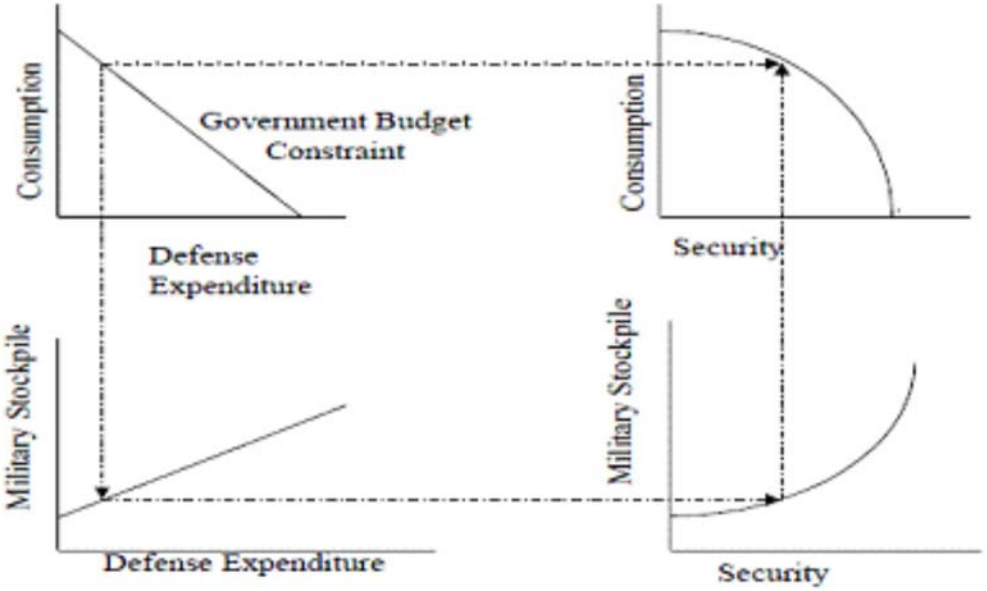
II. THEORETICAL FRAMEWORK

Defense economics studies the defense expenditure management during peace and war and analysis its externalities on other sectors of the economy. Generally defense expenditure is considered as public good expenditure of an economy but defense economics analyzes the integration of defense expenditure and growth of that economy through various routes (Ando, 2009). Figure 1 gives a brief introduction of defense economics. The upper

left part of the Figure shows the government budget constraint in allocation of national income either for defense spending or civil consumption. If government decides to invest more on defense it will contribute in military stockpile on lower left part of Figure leaving the debate why government should do this aside for a moment. This will turn into military power or security shown on lower right part of Figure. The upward turning curve in this part indicates technology improvement and it will interpret the government choice between security and consumption of society on right upward part of Figure. Alesina and Spolare (2008) claim economies of scale in producing public goods and per capita cost of many public goods in large economies is low as tax payers pay for them. Hou (2009) argues that large economies in terms of population or national income are less exposed to external aggression so security is a public good that increases with economy size. That's why small economies have to spend proportionately more than large economies.

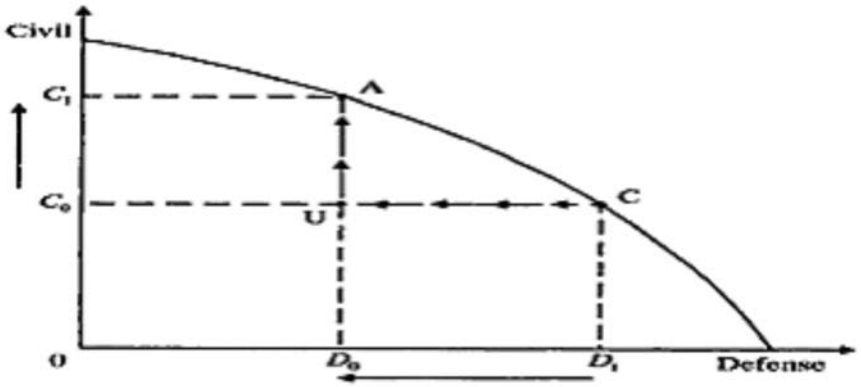
FIGURE 1

Defense Expenditures



This concept can be explained with the classical example of guns verses butter. Now think of an economy that is operating at its potential producing D_1 of military goods and C_1 of civil goods. Imposing a reduction in defense expenditure will move military goods from D_1 to D_0 and civil goods from C_1 to C_0. Time to adjust this change involves costs of dislocation of capital and unemployment.

FIGURE 2



Now economy is producing more of civil goods and the move from *C* to *A* shows the change in preference of the economy. The move will not be directly shifted from *C* to *A* but it adjusts or proceeds through *U*, which is cost of this change, and it might be unemployment or dislocations. The probability that disarmament and armament involve benefits and costs should be treated as investment process (Sandler and Hartley, 1995).

III. LITERATURE REVIEW

Along with above theoretical literature there is enough empirical literature also available which shows the causal relationship between defense expenditure and economic growth and they can be grouped into four categories. First is bi-directional causal relationship between defense expenditure and economic growth, second is unidirectional causal relationship from defense expenditure to economic growth, third is unidirectional causal relationship from economic growth to defense expenditure and last is no causal relationship between defense expenditure and economic growth.

Feedback Causal Relation between Economic Growth and Defense Spending

Tahir and Sajid (1999) study the causality between defense expenditure and economic growth for Pakistan and LDCs. Authors have applied granger causality test on quarterly decomposed series of real defense expenditure and real output from 1961 to 1997 for Pakistan. The results of their paper suggest a feedback relationship in case of Pakistan, India and Iran. There exists a

unidirectional causal relation from gross domestic output to defense spending for Guatemala and Venezuela. A unidirectional causal relation from defense spending to GDP is found for Turkey. There exists no relationship between defense expenditure and GDP for Philippines, Ecuador and Sri Lanka. Still the simple causality results show the existence of bi-directional causality between defense spending and GDP.

Joerding (1986) states that military can affect growth through various routes such as aggregate demand effect. Think of an economy enjoying high growth rates can increase defense spending to protect her from foreign aggression and to maintain internal stability. The important thing here is to review whether defense spending initiates economic growth or defense spending are affected by changes in economy.

Causal Relation Running from Defense Spending to Economic Growth

Kentor and Kick (2008) examine the capital intensiveness of military organization in developed and less developed countries. They have used cross sectional panel regression and causal analysis of developed and less developed countries from 1990-2003. The results show that military spending per soldier inhibit the growth of per capita gross domestic product (GDP). The findings of the study also show that arm imports have positive impact on economic growth but only in less developed countries.

Hou (2009) examines the causes and effect of defense expenditure on economic growth in India and also in broader context taking 36 developing countries in study. He use cross sectional and panel data technique to find the impact of defense expenditure on economic growth for these countries. His results show a negative effect of defense expenditure on economic growth. His findings hold same indication for panel data analysis.

Ando (2009) examines relationship between defense and growth in context of defense economics. Feder model that assumes economy consists of two sectors (private and defense) has been used to estimate the economic growth of 109 countries with 30 OECD included, using panel data from 1995 to 2003. The results show that as defense sector increases, economy will grow and defense spending have not any negative effect on economy.

Lai *et al.* (2002) examine the linkages between balanced economic growth and military expenditure using endogenous growth model that captures demand side factors as well as supply side factors. The results show that when an economy is spending more on its defense it enjoys a high growth rates and endorse Benoit findings that high military spending lead to high economic growth.

Yildrim and Sezgin (2005) examine the relationship between government expenditure and military spending. They estimate the impact of government expenditure on military spending by using panel data technique for 92 countries from 1987 to 1997. The results of their study show a significant and positive impact of government expenditures on military spending.

Causal Relation Running from Economic Growth to Defense Spending

Looney (1989) suggests that national income level of an economy may be viewed as most important determinant to translate the level of military expenditure for that economy. Hewitt (1996) examines the gross national product level and its impact on level of military expenditure. He argues that the relationship might appear convex as estimated coefficient on log of gross domestic product appear negative and they appear positive when he use log of gross domestic product square.

Tamubudzi (2007) examines the defense spending determinants in 12 Southern African countries from 1997 to 2004. He uses the cross sectional and panel data techniques to obtain his results. His findings confirm the importance of gross domestic product (GDP) per capita in determining the level of military burden an economy can afford.

Batchelor (2002) explores the military spending in South Asia from 1963 to 1997. Their empirical results support the level of military expenditure is determined by national income. Sun and Yu (1999) find that the military expenditure in china is positively related to its gross national product (GNP).

Kalyoncu and Yucel (2005) explore direct effect of military expenditure on growth for Turkey and Greece. The study also explores the direction of causality between growth of gross national product (GNP) and military expenditure. For empirical results they use logarithmic form unit root test and Engel-Granger cointegration test on annual data set from 1956 to 2003. The results show that there exist long-run equilibrium between defense spending of Turkey and Greece. The findings of causality test hold that there exists a unidirectional causality from growth to defense spending for Turkey.

No Causality between Defense Spending and Economic Growth

Habibullah *et al.* (2008) explore the relationship between military expenditure and economic growth in selected Asian countries including Pakistan from 1989 to 2002. They use unit root test, panel cointegration test base on Larson *et al*. (2001) and panel error correction test based on Pesaran

et al. (1999). They find that military spending and real gross domestic product (GDP) per capita are integrated with unit root test. The panel cointegration test shows long-run relationship between military spending and economic growth. The panel error correction test shows that military spending and economic growth are not related in Asian countries.

Khan (2004) examines the plausibility of using defense expenditure as a macroeconomic stabilization tool (Military Keynesianism Hypothesis) in case of Pakistan. The author has used Johansen's cointegration techniques and the vector error correction modeling from Fiscal Year 51 to 2003. The results indicates that defense expenditure are not burden or do not hurt economic growth during the estimation period. In case of Pakistan the Military Keynesian hypothesis does not hold too. The paper also undermines the prevailing view that increases in defense expenditure are accompanied with the decline in development expenditure.

Al-Yousif (2002) explores the relationship between economic growth and defense expenditure in six Gulf countries taking a time period from 1975 to 1997. A multi-variant error correction model has been used with granger causality test by author to get results. The results indicate that the relationship between growth and defense spending cannot be generalized and must be seen in context of socio-economic conditions of an economy.

Aslam (2007) examines the linkages between social expenditures, defense spending and economic growth for 59 countries across different regions from 1972 to 2000. In her study she addresses the effect of defense expenditure on growth and explores that to what extent defense spending are fueled with other social spending by using Feder model (1982). The empirical results do not show any trade-off between social expenditure and defense expenditure and show no significant productivity impact on economic growth for Asia region.

Looney (1995) addresses the question that does defense spending effect low saving rates of Pakistan and how this effect is different from other government spending. Haiso tests have been used to draw results about the relationship of defense spending and saving rates. It provides little evidence that saving rates of Pakistan are affected by her military spending, albeit, its impact is different from other government expenditures on saving rates.

IV. DYNAMICS OF PAKISTAN DEFENSE SPENDING

Military spending remained high on an average of 6.62 percent of GDP till 1999 but then there is a notable change in 2000 when these spending fell from 5.1 percent to 4.1 percent. Then it started to increase from 2001nto

2003 and declined again. This was due to foreign military aid after war on terror and inclusion of defense pensions in civil budget (IMF, (ROSC) Pakistan).

The justification for Pakistan high defense spending provided by the decision makers and policy formulation bodies is mostly based on the state's security due to potential threats from inside and outside the territories. After the partition of subcontinent in 1947 the rivalry began between Pakistan and India. These two countries shares almost same institutions, budgetary mechanism and political structure but differ in religion, foreign policy and coalition, so both came front to front on many conflicts. The government and military of Pakistan perceive India as a potential threat to its sovereignty. As in 1980s General Zia-ul-Haq the then president and chief of army staff refused to impose any cut on defense expenditure as he stated that no one can fight a nuclear submarine and jets with sticks so we had to match our arsenal capabilities with our adversaries, so Pakistan cannot afford any reduction in defense spending, as you cannot congeal the security threats to Pakistan (Chawla, 2001). These security threats lead Pakistan and India to fought four wars on different territorial locations.

TABLE 1

Conflicts between Pakistan and India

Year	Location
1947-48	Northern Kashmir
1965	Punjab and Sindh
1971	East-Pakistan
1999	Kargil

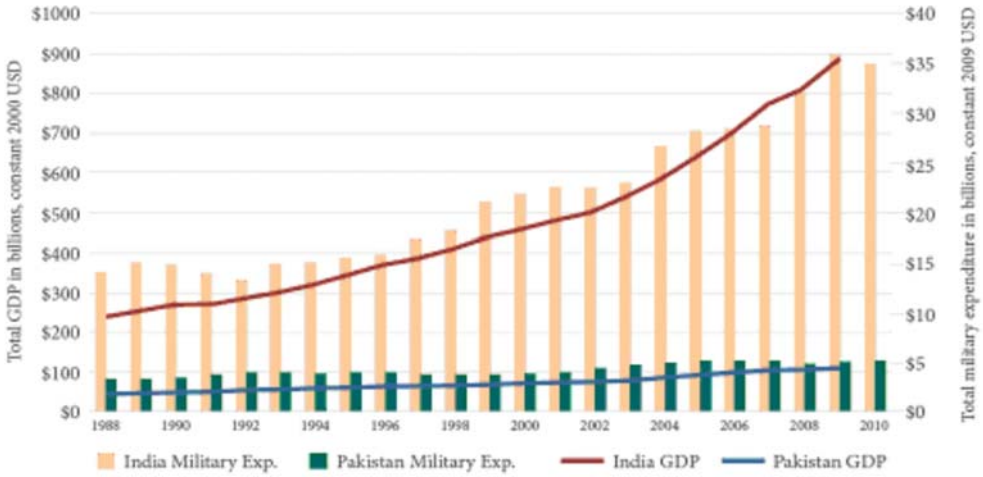
These conflicts and security threats results in arm race between these two neighbouring countries, which is a classical example of arm race in recent times. These action-reaction acquisitions of arsenals cause a high allocation of resources towards defense. Hollist (1977) indicates that the coefficients of reaction are not clear by using Richardson type arms race model and a period from 1949 to 1973. Deger (1990) reports that there is asymmetric arms race between Pakistan and India and Pakistan shows high response to India's military spending.

Dunne *et al.* (1999) uses bi-variant VAR model for a period 1962-96 and find an action-reaction arms race between Pakistan and India. Yildrim

and Ocal (2006) use multi-variant model and find a bi-directional causality between Pakistan and India.

FIGURE 3

GDP and Military Expenditure of India and Pakistan



Source: An Introduction to Pakistan's Military. Belfer Center for Science and International Affairs, 2011.

The Soviet invasion of Afghanistan in 1979 had a profound impact on Pakistan's security as the country emerged as a front-line state in the war against communism and found it uncomfortably placed in a two-front threat scenario such as no other South Asian state has ever experienced. On the other hand, the war on terror in Afghanistan also made Pakistan the no.1 ally of the United States and a front line state. During the both Afghan Wars, the United States provided unequivocal support to Pakistan, which gave it the self-confidence to withstand Soviet pressure and fight with Taliban and terrorists in the war against terror. In this regard, Pakistan courageously opposed the Soviet invasion and took a leading part in condemning Soviet aggression in all international and regional forums.

The Afghan War provided political legitimacy to General Zia and General Musharaf's military rule, which had been highly unpopular in the country. Afghan refugees posed an alarming threat to Pakistan's security. Domestically, the Afghan refugees have not only created political, economic and socio-cultural problems for Pakistan, but they also introduced drugs and a Kalashnikov culture. Suicide attacks, local insurgencies and insecurity has the made the life of the people of Pakistan miserable. The Afghan Wars also

allowed ethnic and sectarian warfare and Islamic fundamentalism to tighten their grip on the country. Moreover, the consequences of the Afghan war damaged Pakistan's international image, spreading a narrow and violent version of Islam throughout the region and increasing tensions with its neighbours.

Pakistan is fighting an insurgency against the Taliban, Tehrik-e-Nifaz-e-Shariat-e-Mohammadi (TNSM), al Qaeda, the Islamic Movement of Uzbekistan, and a host of home-grown terror groups such as Laskar-e-Taiba, Harakat ul-Mujahidin, Lashkar-e-Jhangvi and others. By 2003, a loose alliance of tribally-affiliated and personally-linked militant extremist groups had begun to identify itself as the Tehrik-e-Taliban Pakistan (TTP). The Taliban's growth as an insurgency in Pakistan strengthened beginning in 2004 when heavy pressure from Washington to cut off infiltration into Afghanistan led Pakistan's President Pervez Musharraf to order tens of thousands of troops into North and South Waziristan. Efforts by Pakistan's premier military security organization, the Inter-Services Intelligence (ISI), to exercise control over this area destroyed much of their remaining traditional structures.

Over the next several years, a TTP presence was felt in most of the remaining tribal agencies and then in adjoining districts of the NWFP in the so-called settled areas. Pakistan had to face many insurgencies in Sawat, NWFP, Balochistan and other parts of the country. Pakistan sacrificed more than 3000 of its military and civilian persons including one general and also the great leader Benazir Bhutto and her borders both at eastern and western sides are not safe. This threat including with local insurgencies made it essential for Pakistan to improve its defense capabilities.

Due to the important role of military in power politics of Pakistan, the civil bureaucracy cannot dictate or supersede military in the defense budgeting process. Ministry of Defense, Ministry of Foreign Affairs and Ministry of Finance constitute the bureaucracy involves in defense decision-making. The organizational structure of ministry of defense is twisted to save guard the military interests. Serving and retired military officials occupy central positions in the ministry which make possible to them to control and monitor the work according to the desires of the military establishment. The civilian officials within the ministry also have enough authority to handle military affairs on their own (Siddiqah-Agha, 2000). The ministry of foreign affairs serves government in locating sources of supply for weapons. The ministry does not have hands-on the procurement process and its importance

in arms procurement varies with the heads of government in Pakistan (Chawla, 2001).

The ministry of finance is an important body in defense decision-making as it controls the finances of the military establishment but It does not have the influence over the decisions made by military in Pakistan. The ministry of finance faces immense pressure from the military to provide funds for the maintenance of the existing infrastructure and for acquiring new equipments. Given the resource limitation the ministry of finance cannot reduce the funds for military but can delay other funding under its authority (Siddiqah-Agha, 2000). This is also explained by bureaucratic model of Lucier (1979), which states defense expenditures as a characteristic of bureaucracy to protect their status quo and future budgeting (Jeffrey, 1999).

V. METHODOLOGY AND DATA SOURCES

Johansen Cointegration and Granger Causality tests have been applied to obtain empirical results by using a time series data from 1980 to 2010. The model is based on Keynesian military theory which explains that defense spending make spillover effect and boosts the economic growth. The data which this study has been used for estimating the causal relation between defense spending and economic growth has obtained from World Bank, SIPRI, various issues of Economic survey of Pakistan and from different research papers. All the data for the variables are taken in percentages of GDP. The variables which are used along with defense spending to explain the relation of economic growth with defense spending are given below:

$$GDP \int (EX, IMP, INV, ME)$$

GDP	Gross Domestic Product
EX	Total Exports
IMP	Total Imports
INV	Gross Domestic Investment
ME	Military Expenditure

The GDP growth rate data is obtained from World Bank data and various issues of Economic survey of Pakistan. The percentage growth rate of GDP is calculated on market prices on bases of constant local currency and does not include any subsidies on products. It shows the pace of an economy and the direction of its development. Some scholars also use this variable to look the living standards of people living in an economy because

it indicates the fiscal and macro-economic standards of a country so there is a strong relation between economic growth and public policy.

In case of developing countries the published defense spending should be treated with care because of aggregate budget categories, military assistance and involvement of military in civil projects. This paper is using the data of defense spending compiled by the World Bank on definition provided by the NATO. The data on defense spending includes the whole range of current and capital spending on armed forces like ministry of defense, paramilitary forces, military research & development, operations and maintenance and procurement.

It does not involve civil defense spending on previous military activities and conversion or destruction of weapons. Defense consumes a large portion of total income of an economy therefore it has been under the debate of many scholars that whether spending on defense is useful or wasteful. The level of defense spending depends upon the regional and geo-strategic condition of particular country so a country with more threats will spend more on its defense and vice-versa. This is an issue of high consideration for policy analysts.

The data for exports is extracted from World Bank data and various issues of Economic survey. It includes all the goods and services which are provided to world and does not include factor services and transfer payments. Exports are one of the main drivers which drive the economic growth of an economy and main component of international trade. It reflects the domestic industry performance of an economy and productivity of that economy.

The data for imports is obtained from World Bank data and various issues of Economic survey. It includes all the goods and services which are received from the world and does not include the factor services and transfer payments. Imports are usually proclaimed as unpleasant activity for an economy as a huge money is consumed on goods and services which are not available in a particular economy but import of consumer goods can make a competitive environment for local manufacturer to develop their technology and import of services in some sectors can be used to develop human resource.

The data for gross domestic investment has obtained from World Bank data and various issues of Economic survey. It includes net changes in the level of inventories, land improvements, plant, machinery, equipment, construction of roads, railways, construction of schools, offices, hospitals,

private residences, commercial and industrial buildings. It is a good indicator of productive capacity of an economy which interns contributes to economic growth.

VI. RESULTS

At first stage time series is tested to check the stationary through proper unit root analysis. Underlying assumption in Econometric models is that the present time series is stationary. If this assumption is violated then the whole analysis will result into nothing and in this case the regression will become spurious. A nonstationary time series has an infinite memory and it is not mean reverting. One popular example is the random walk model where the data is derived by random shocks. Now by infinite memory it means that the effects of shocks will persist very long time. As the consequences of non-stationary have dire effect on the results of regressions so we need to know wither the data we are dealing is stationary or not.

In the literature, two tests are generally applied to find out the order of integration but study applied the ADF (Augmented Dickey-Fuller, 1979). Table reports that all the tests of unit root of these variables, τ_t-statistics corresponding to the parameter $\rho = 0$, the calculated t values are compared with tabulated τ_t values, the statistics shows that all the variables (*i.e.* GDP growth, real investment, exports, imports, and military expenditures) are I(1) in their levels and I(0) in the first difference at five percent level of significance. Augmented Dickey-Fuller test has been applied to check the stationarity of the variables. All the variables are stationary at first difference. Table 2 contains the ADF values of all variables which are statistically significant.

TABLE 2

ADF Values of All Variables

Variables	With Intercept		With Trend and Intercept		Conclusion
	Level	1st Difference	Level	1st Difference	
EX	−	–5.31	−	–5.21	I(1)
GDP	–3.81	–6.77	−	–6.63	I(1)
IM	−	–6.88	–3.59	–6.77	I(1)
INV	−	–3.31	−	−	I(1)
MEX	−	–4.32	−	4.90	I(1)

Table 3 presents the results of the Johansen maximum likelihood method of testing for cointegration. The test is used to check the long-run relation among the variables. If the values of trace statistics (based on Likelihood ratio) and values of Max. Eigen values are greater than their critical values then we will reject H_0. Here $R = 0$ shows there is no co integrating vector means there is no cointegration found at $R = 0$. Now we move towards $R \leq 1$ here both the values are greater than their critical values and refer to rejection of H_0. Now variables moves to $R \leq 2$ here both values are lower than their critical values and refers to acceptance of H_0 this means that here two co integrated vector found. In this case cointegration is found among the all the variables (GDP, Real Investment, Imports, Exports and Military expenditures).

TABLE 3

Johansen and Juselius (1990) Maximum Likelihood Test for Cointegration

Null Hypothesis	Trace Statistic	0.05* Critical Value	Prob**	Max-Eigen Statistic	0.05* Critical Value	Prob**
$R = 0$	129.6712	95.75366	0.0000	49.41161	40.07757	0.0034
$R \leq 1$	80.25957	69.81889	0.0058	33.93469	33.87687	0.0492
$R \leq 2$	46.32488	47.85613	0.0691	24.75271	27.58434	0.1105
$R \leq 3$	21.57216	29.79707	0.3229	15.85223	21.13162	0.2336
$R \leq 4$	5.719938	15.49471	0.7283	5.443478	14.26460	0.6851

Notes: (*a*) Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

(*b*) Max-eigen value test indicates 2 cointegrating eqn(s) at the 0.05 level

(*c*) * denotes rejection of the hypothesis at the 0.05 level

(*d*) ** MacKinnon-Haug-Michelis (1999) p-values

The variables are found to be cointegrated which indicates long-run relationship between these variable. So the next step is to find short-run dynamics and for this purpose Error Correction Model (ECM) has been applied. There are two important things, the sign of the ECM term and its statistical significance. The ECM term can be either positive or negative. If it is positive, then it means that the equilibrium is unstable. If it is negative, it implies that the equilibrium is stable. Then comes the statistical significance of the ECM term. If the ECM term is insignificant, it means that the system is always in equilibrium, *i.e.* there are no short term disturbances. If the ECM

term is significant then there exists a short-run relationship. The value of the ECM term (after converted into percentage) indicates the speed of adjustment per period of time towards the long-run equilibrium. The ECM vector indicates three variables with significant T-value among them and two variables with negative sign. These variables are GDP growth –0.557135 [–2.86942], Military spending –0.060089 [–2.04863] and imports 0.946164 [4.31762] where ECM term for other variables appear insignificant and with positive sign. ECM parameter (α_1 = –0.557137) implies that 55.71% of the long-run equilibrium deviation is corrected annually and it applies to all. The results of ECM are given in Table 4.

TABLE 4

Result of ECM

Error Correction	D(DGDP)	D(DMEX)	D(DIM)	D(DEX)	D(DINV)
CointEq1	–0.557135	–0.060089	0.946164	0.006170	0.127350
	(0.19416)	(0.02933)	(0.21914)	(0.12746)	(0.09856)
	[–2.86942]	[–2.04863]	[4.31762]	[0.04841]	[1.29213]
D(DGDP(–1))	–0.240019	0.032508	–0.423909	–0.033992	–0.018360
	(0.17217)	(0.02601)	(0.19432)	(0.11302)	(0.08739)
	[–1.39410]	[1.24989]	[–2.18155]	[–0.30075]	[–0.21008]
D(DMEX(–1))	–1.596421	–0.288998	–2.835331	0.619488	–0.317400
	(1.24666)	(0.18833)	(1.40703)	(0.81841)	(0.63281)
	[–1.28056]	[–1.53455]	[–2.01512]	[0.75694]	[–0.50157]
D(DIM(–1))	–0.825995	–0.060222	0.251382	–0.018440	0.266437
	(0.20611)	(0.03114)	(0.23262)	(0.13531)	(0.10462)
	[–4.00758]	[–1.93414]	[1.08064]	[–0.13628]	[2.54667]
D(DEX(–1))	0.730222	–0.005373	0.050003	–0.626558	–0.164609
	(0.31041)	(0.04689)	(0.35034)	(0.20378)	(0.15757)
	[2.35243]	[–0.11459]	[0.14272]	[–3.07469]	[–1.04469]
D(DINV(–1))	–0.637874	0.164227	–0.565257	0.264902	–0.335422
	(0.39468)	(0.05962)	(0.44545)	(0.25910)	(0.20034)
	[–1.61618]	[2.75442]	[–1.26895]	[1.02239]	[–1.67425]
C	0.065790	0.004484	–0.178739	0.151570	–0.183449
	(0.46579)	(0.07037)	(0.52571)	(0.30578)	(0.23644)
	[0.14124]	[0.06373]	[–0.33999]	[0.49568]	[–0.77588]

Table 5 shows the results of Granger-causality. If the value of F-statistic for the required observations is 4 and probability value is less than 0.05 then H_0 will be rejected.

Table 5

Granger Causality Test Results

Null Hypothesis	Obs	F-Statistic	Probability
EX does not Granger Cause GDP	28	1.47108	0.25050
GDP does not Granger Cause EX		2.54955	0.09998
IM does not Granger Cause GDP	28	1.36696	0.27482
GDP does not Granger Cause IM		22.0421	4.5E-06
INV does not Granger Cause GDP	28	3.17564	0.06056
GDP does not Granger Cause INV		19.2921	1.2E-05
MEX does not Granger Cause GDP	28	0.90764	0.41745
GDP does not Granger Cause MEX		6.50010	0.00579

Exports do not cause GDP and similarly GDP does not cause exports because the F-statistic value is smaller than 4 and probability value is greater than 0.05. Imports do not cause GDP but GDP causes imports. Investment does not cause GDP but GDP causes investment. Military spending does not cause GDP but GDP causes military spending.

VII. CONCLUSION

The findings of this study are similar to the findings of Khan (2004) that defense spending do not hurt economic growth but also cannot be used as macroeconomic stabilizer and differs from the findings of Tahir (1995) which indicate a feedback relation between economic growth and military spending. In this period, the study finds defense spending and economic growth cointegrated but the relation is flowing from economic growth to defense spending. Every developing or developed country surely has its own problems which determine the defense spending or bound the cuts in defense spending. These particular problems range from civil war, regional wars, militarization of security policy, military regimes, and use of military to suppress internal voices or conflicts to involvement of foreign powers. All these circumstances indicate a non-linear relationship between maintaining present level of defense spending and reduce defense spending. The arms

transfers have positive impact when the threat is high and decrease in defense spending during conflict or civil war may subvert the very basis of state.

VIII. RECOMMENDATIONS

Both India and Pakistan are large markets with great economic opportunities but the economic relations between them have never been progressive. Therefore, reduced bilateral trade, higher military expenditure, less development expenditure and less general trade openness are all conflict enhancing elements. Trade can be increased with India to reduce threat perception and rivalry. India gave the Most Favoured Nation (MFN) status to Pakistan but Pakistan still has not been able to reciprocate it due to its concerns.

Defense no doubt is a vital element of national security but policy makers should consider economic, social, energy and other elements of national security. Defense spendings are recently high due to non-traditional warfare but it should be regulated in order to avoid the security paradox. The defense budget should be made transparent and accountable. The defense budget should come under proper heading in annual budget sheet.

Pakistan needs to acquire and maintain a high GDP growth to increase the pace of development and to alleviate poverty. Poverty at its present high level is a threat to the state and national integration by fueling the conflict in social structures.

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A NOTE ON FOOD INFLATION IN PAKISTAN

MUHAMMAD NADIM HANIF*

Abstract. Food inflation hurts poor more than rich as poor spend higher proportion of their income on food items as compared to rich. Higher global food and crude oil prices in 2008 resulted in higher (than historical average) food inflation in Pakistan. Global food inflation caused food inflation in Pakistan. However, food inflation diffusion has been lower as compared to non-food inflation in Pakistan. Food inflation volatility in Pakistan was found to be half of that observed in the world. Compared to global food inflation persistence, there is no evidence of food inflation persistence in Pakistan. However, within the food group, most of the goods, which were manufactured, exhibited inflation persistence. With the help of comparison of food inflation with wage increases for labour (after 2008 global commodity prices shock), the poor (labour class) was found to be at disadvantage.

Keywords: Inflation, Food inflation, Persistence, Volatility, Diffusion, Pakistan

JEL classification: E31

I. INTRODUCTION

"*…. inflation tends to redistribute income and wealth. It is said to redistribute income away from wage earning classes who are alleged to consume it all, and towards the profit recipients in the community who are alleged both to save a good deal and to invest their savings ….*" (Milton Friedman, 1963, p. 13)

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*The author is Senior Economist in Research Department of State Bank of Pakistan, Karachi (Pakistan). E-mail: muhammadnadeemhanif@yahoo.com

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It is usually said that inflation hurts poor more than rich. I would suggest rephrasing this saying as food inflation hurts poor more than rich. Poor individuals spend larger proportion of their income on food compared to rich. It is also true for low and middle income countries, in particular. In low and middle income countries, food spending share (40 percent) is double compared to high income countries (20 percent) despite the fact that with the passage of time these shares have declined with increase in real per capita income as suggested by Engel's Law.[1] Engel's Law states as income rises, the proportion of income spent on food falls (and thus income elasticity of food is between 0 and 1). South Asian countries, including Pakistan, are concerned with food inflation as half of the world poor (people living below US $ 1 per day) live in SAARC region.[2] Pakistan recently graduated from low income group to lower middle income group as reported by World Bank income group classification. With rising per capita income in Pakistan, share of food expenditure has also declined from 61.60 percent in 1959-60 to 34.83 percent in recent most revision of CPI basket in 2007-08 by Pakistan Bureau of Statistics. Notwithstanding the recent lowering of food related items' weight in Pakistan's CPI basket, our share of food expenditure is lower than that of Bangladesh (58.84), India (46.19), Philippine (46.58) and Sri Lanka (45.50).

Higher food and oil price rise in 2008 (than recent historic levels) resulted in above (historical) average food inflation in Pakistan in subsequent months. Pakistan was worst hit by the global food and oil price rise of 2008. We had to import wheat at historical high prices. Generally, Pakistan is not a net wheat importer, especially after 2000. When we were completely out of the impact of 2008 international food and oil prices shock effects on food inflation in Pakistan, we were severely hit by devastating floods in 2010 and heavy rains in 2011. It resulted in another rise in food inflation, particularly related to perishable food items, during the last two years. Latest inflation data indicated deceleration of food inflation to single digit levels (after more

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[1]Specifically, food spending share is 48.5, 31.1 and 20.4 percent for low, middle and high income countries respectively as documented (based on World Bank International Comparison Programme, 2005) in Table 9 (budget shares for broad aggregates and conditional budget shares for food categories) available at Economic Research Service (US Department of Agriculture) website http://www.ers.usda.gov/Data/International FoodDemand/ retrieved on April 11, 2012. In the study of 144 countries the low (high) income countries are those which have real per capita income below 15 (above 45) percent of US real per capita income and rest are middle income countries.

[2]http://www.nationmaster.com/graph/eco_pov_sha_of_all_poo_peo-poverty-share-all-poor-people#source

than 50 months of double digit food inflation). Unfortunately, there is another wave of rising global food prices, at least in the case of wheat, corn, and soybean prices which have increased significantly during the last couple of months (June-July 2012). Despite its importance, as rising food prices are becoming a growing policy challenge, we do not find any comprehensive study on reasons, features and consequences of recent food inflation episode in Pakistan. This study attempts to fill this gap in the literature.

Dataset used for analysis in this study and the methodological approaches applied are briefly given in section II. In section III, a brief review of literature is presented. Insightful observations are shared and empirical findings are discussed in section IV. Last section is reserved for conclusion.

II. DATASET AND METHODOLOGICAL APPROACHES

In this study both Pakistan and world food prices related data for January 1992 to December 2011 has been used. Monthly consumer price index (CPI) as well as wholesale price index (WPI) data regularly released by Pakistan Bureau of Statistics (PBS) has been used. Monthly world commodity prices data released by IMF has been used as a proxy for global prices. For investigation of the phenomenon of inflation persistence in Pakistan, monthly changes in prices of (374) individual commodities, as reported by PBS for July 2001 to June 2011, have also been used in this study. Skilled and unskilled labour wage increases during June 03 to June 11 have been used, from the labour force survey of PBS, for the purpose of comparison of food inflation with wage increases.

Initial insights are built upon simple statistical measures (like mean and standard deviation) and graphical analysis. The rigorous analysis is then based upon applied time series econometrics. The first step in the time series analysis comprises testing degree of integration of the series of interest. Dickey and Fuller (1979) unit root test has been used to test the degree of integration of food inflation in Pakistan and that of world. Lag selection (and inclusion of intercept and/or trend) has been decided on the basis of their statistical significance in the estimated equation. For causality analysis, Granger (1969) non-causality test has been used to test the null hypothesis that food inflation in Pakistan is not driven by the world food inflation against the alternate that food inflation in Pakistan is driven by the world food inflation.

When there is higher (than average) food inflation in the country, it is important to see how wide spread is the inflation in the basket of food items. For this purpose an index called Inflation Diffusion Index (IDI) is constructed (for the first time in Pakistan). IDI is the difference between the share of items with increasing prices and the share of items with decreasing prices in the group we are interested in. In case IDI is zero, it means the share of commodities with increasing prices equals the share of items with decreasing prices in the group. Since IDI measures the spread of inflation amongst commodities, wider is the spread of inflation amongst the commodities when higher is the inflation levels based on an established phenomenon of positive relation between the level and dispersion of inflation.

Since Pakistan has just ended the longest phase of double digit (YoY) inflation in history. It would be useful to look at the inflation persistence in Pakistan. Persistence in inflation refers to the dependence of current inflation on its own past values. Hanif *et al.* (2012) studied this phenomenon at overall, group-wise, and at the micro level using month-on-month (MoM) inflation figures of 374 commodities used to be in the Pakistan's CPI basket prior to July 2011. In this study, the phenomenon of persistence is explored for the volatility in food inflation in Pakistan as well. For global food inflation, persistence is diagnosed both at level of and volatility in the MoM changes in food prices. Generally, a first order autoregressive [AR(1)] model, $\pi_t = \mu + \alpha\pi_{t-1} + \varepsilon_t$, is estimated for the degree of (inflation) persistence. Here π_t denotes the inflation at time t, μ is the mean inflation rate, and α is the AR(1) coefficient. Statistically significant estimated (positive) coefficient implies a positive serial correlation, and thus inertia, in the inflation series. Similar approach is used for persistence in volatility in food inflation.

Bilquees (1988) found that the debate on monetarists versus structuralists view on inflation determinants is relevant for Pakistan. Notwithstanding this debate, State Bank of Pakistan has herself been pointing out from time to time the supply side as one of the explanations of inflationary in the country, at least during the periods of relatively higher inflation. In this study we have used monthly time series data on key macroeconomic variables of Pakistan economy for July 1993 to June 2011 and structural vector autoregression (SVAR) to quantify the role of supply (and demand) shocks in explaining the (errors in forecasts of) overall and NFNE inflation in the country.

III. LITERATURE REVIEW

Understanding inflation has always been an area of interest in theoretical as well as empirical economics research around the world. But food inflation could not attract same attention in the economics literature. Similarly, while inflation in Pakistan attracted some economics researchers, food inflation could not. It might be because food inflation had usually been lower than non food inflation in Pakistan after 1961-70 (when higher food inflation was observed in Pakistan prior to the recent episode). However, some studies focusing on overall inflation considered some food related items as one of the determinants of inflation in the country. Such studies include Khan and Schimmepfennig (2006) and Hanif and Batool (2006). While examining the monetarist's versus structuralist's hypothesis using monthly time series data (from January 1998 to June 2005) of credit to private sector, broad money supply, nominal exchange rate, and support price of wheat (representing supply side) Khan and Schimmepfennig (2006) found that while monetary factors played dominating role in determining inflation in Pakistan with a lag of around one year, wheat support price also had an impact on inflation in the country though in the short run. Hanif and Batool (2006) also found the support for significant and positive contribution of (contemporaneous growth in) support price of wheat to inflation in Pakistan (in addition to lagged and contemporaneous reserve money growth, real GDP growth, and international trade openness) based on annual data for 1973-2005. After Khan and Schimmepfennig (2006) and Hanif and Batool (2006), there have been some separate studies on food inflation in Pakistan which are discussed below.

UN (2008), based on partial equilibrium simulation modeling using Household Integrated Economic Survey (HIES) PSLM data for 2005-06 and rapid assessment household surveys and trade surveys, assessed the impact of price spiral and food shortages on the livelihood and general welfare of Pakistani households, particularly vulnerable and marginalized ones. This study's findings indicated that more than half of the surveyed households experienced high food prices as a shock. The simulation study showed the poorest (richest) quintile spent 13 (5) more on food during the shock period as against two years earlier. This assessment suggested that the household who cannot afford to obtain medical assistance when proportion of sick people increased from 6 percent to 30 percent. This study was based on a mission fielded for a very short period of time during June 9 to July 13, 2008 and thus lacks a lot what happened to food prices after July 13, 2008 and the subsequent implications for people of Pakistan.

Hanif *et al.* (2010) while building a macroeconometric model for Pakistan economy formulated two separate equations for food and non-food inflation considering monetary policy might have relatively more influence on non-food inflation compared to food inflation. Based on the annual dataset for 1973-2006, they found wheat support price and real output in the Pakistan to be the main determinants of food inflation in the country. This study was, however, confined to determinants of food inflation in Pakistan. Akhtar (2009) studied food inflation in relatively more detail. He used reduced form modeling to quantify the impact of macro policies (such as support prices), agriculture output, import and export prices and quantity indices, and money broad supply on food inflation in Pakistan over the period of 1991 to 2006. He found that growth in broad money supply played a major role in inflation in Pakistan while growth in the index of food production helped dampen the food inflation in the country. He found the impact of agriculture support prices on inflation in the country to be positive and significant. His finding of higher impact of unit value index (of food import) in accelerating food inflation in Pakistan than (food import) quantity index in stabilizing food prices in Pakistan suggested higher international food prices transmitted large positive impact on Pakistan food prices compared to liberal food imports policy's small negative impact on domestic food prices. This study was based on a very limited time period dataset and is open to technical criticism due to use of small number of observations for such analysis.

One the basis of above (and others') findings of impact of international prices on national prices, it will be pertinent if we can see what other countries' studies found about the role of global factors in local (national) inflation. Mumtaz and Surico (2008) based on their study of 11 countries (UK, US, Spain, New Zealand, Netherland, Japan, Italy, Germany, France, Canada, and Australia) using quarterly data for 1961:1 to 2004:3 found that inflation rates were much closer across the countries (than in 1970s). Their results suggested that there had been a fall in the level, persistence, and volatility of inflation across the sample countries. They observed an increase in the co-movements of inflations rates across the countries during the last two decades of their study. The on-going globalization was suggested by them as one of the explanatory factor for such increased co-movement of inflation rate. Ciccarelli and Mojon (2008) also showed that inflation in 22 OECD countries was largely a global phenomenon as a common factor alone accounted for about 70 percent of variance in their inflation rates. The co-movement of inflation was found to be largely a result of common shocks. There was a robust 'error correction mechanism' which brought national

inflation rates back to global inflation. Global inflation was found to be a function of real developments at short horizons and monetary developments at long horizon.

In the light of reviewed studies, we would like to explore in this study the role of global food prices in food inflation in Pakistan. In addition, important features like volatility and persistence of food inflation in Pakistan are going to be explored for the first time in this study.

IV. EMPIRICAL OBSERVATIONS AND FINDINGS

Let us start with an observation based upon domestic and global food prices behaviour. Though we are out of the impact of world food price shock of 2008, our food prices inflation is still linked to global food inflation. Figures 1 and 2 show Pakistan and world food inflation move in tandem. They not only move in tandem, food inflation in the world causes food inflation in Pakistan whether it is 'month on month' or 'year on year' basis. In order to see the role of world food inflation in the Pakistan's food inflation we formally conducted the Granger non-causality test. However, before applying the Granger non-causality test we need to see if the underlying times series are stationary or not. Using Dickey Fuller test for unit root we find that both the Pakistan and World food inflation series are stationary (see Table 1a and 1b). Food inflation in Pakistan is largely driven by the world food inflation. That is what we find when we tested the Granger non-causality hypothesis and found it rejected for the period January 1992 to December 2011 (see Table 2a and 2b).[3]

TABLE 1a

Results of Unit Root Analysis of MoM Inflation

Variables	DF Test Value (p-values in parenthesis)*	Lag (included) Max Lag = 13
Pakistan Food Inflation (Level)	–13.90 (0.00) –2.73 (0.0080)	0
World Food Inflation (Level)	–10.35 (0.00) –3.89 (0.0057)	0

*MacKinnon's one-sided p-values. We followed 'Schwartz Information Criteria' for lag selection.

[3]It is pertinent to state here that analyzing what determines global food inflation is out of the scope of this study. Such determinants may include: shift in demand and supply in world, increased biofuel production/consumption, higher energy prices, changes in weather patterns, and/or higher food consumption in emerging economies in addition to global monetary factors including US dollar exchange rate dynamics.

TABLE 1b

Results of Unit Root Analysis of YoY Inflation

Variables	DF Test Value (p-values in parenthesis)*	Lag (included) Max Lag = 13
Pakistan Food Inflation (Level)	–1.46 (0.55) –2.73 (0.0080)	12
World Food Inflation (Level)	–2.16 (0.22) –3.89 (0.0057)	12
Pakistan Food Inflation (First Difference)	–7.72 (0.00) –2.73 (0.0080)	11
World Food Inflation (First Difference)	–8.52 (0.00) –3.89 (0.0057)	11

*MacKinnon's one-sided p-values. We followed 'Schwartz Information Criteria' for lag selection.

TABLE 2a

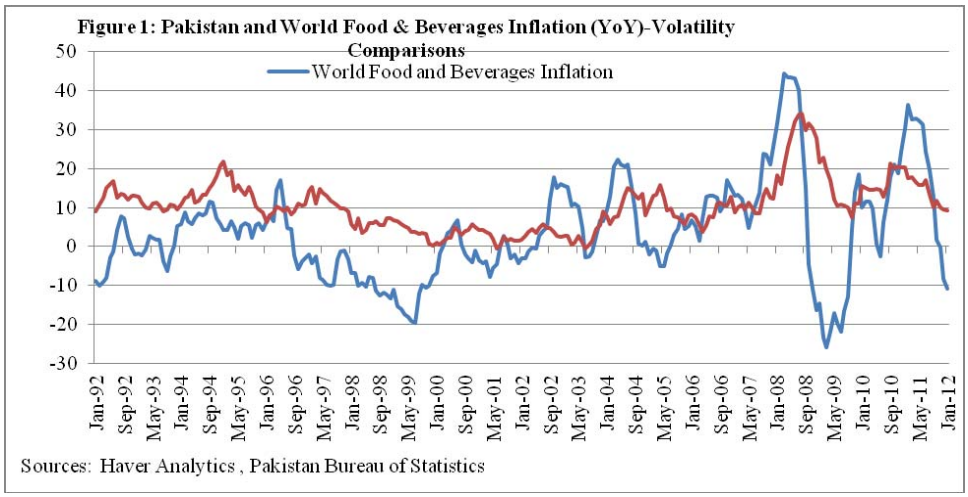
Results of Granger Non-Causality Test (MoM Inflation)

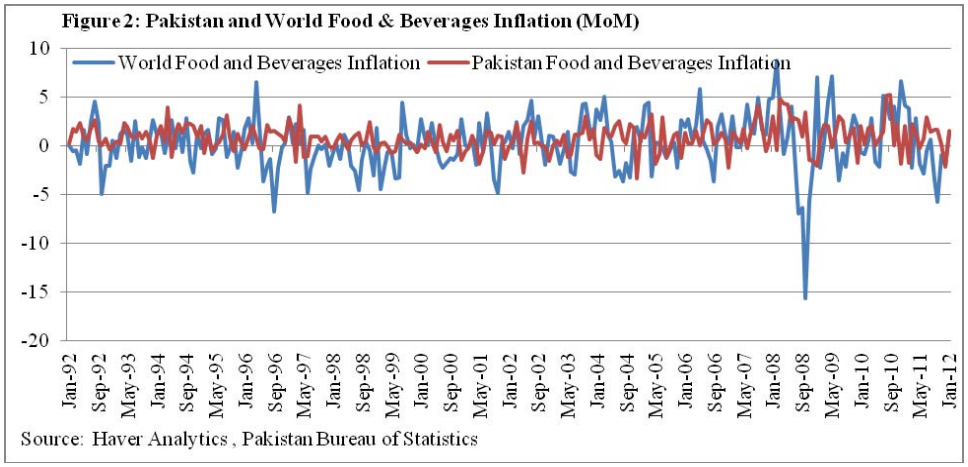
Null Hypothesis	F-statistic	Probability	Result
World Food Inflation does not Granger cause Pakistan Food Inflation	2.82	0.00	Rejected
Pakistan Food Inflation does not Granger cause World Food Inflation	1.06	0.40	Unable to reject

TABLE 2b

Results of Granger Non-Causality Test (YoY Inflation)

Null Hypothesis	F-statistic	Probability	Result
Δ in World Food Inflation does not Granger cause Δ in Pak Food Inflation	3.09	0.00	Rejected
Δ in Pak Food Inflation does not Granger cause Δ in World Food Inflation	1.33	0.20	Unable to reject



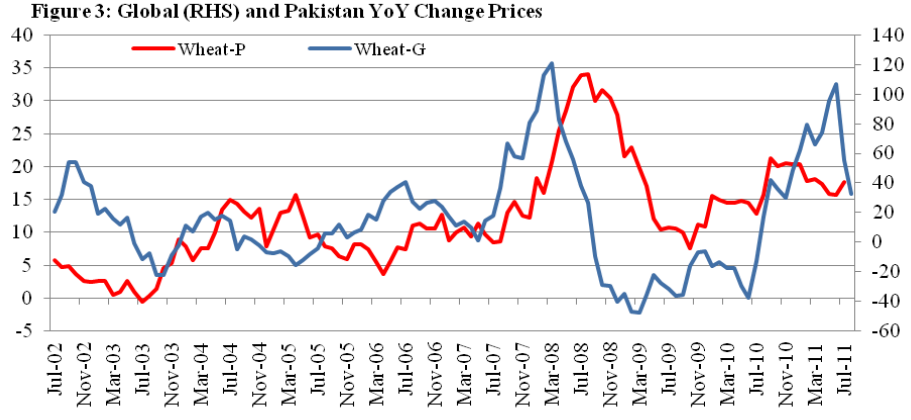


Overall behaviour of food inflation in Pakistan was found to be the result of changes in global prices of food at commodity levels during the analysis period. It can be clearly seen from the Figures 3 to 6 (pertaining to wheat, rice, palm oil, and sugar price changes in Pakistan and world) that inflation in these commodities prices in Pakistan followed changes in corresponding commodities' prices in world market being a small open economy.[4] There is a limited set of commodities inflation in which leads to

[4]Pakistan is the third largest world exporter according to world rice exports in 2010. On the other hand, Pakistan is fourth largest world importer of palm oil according to world palm oil exports in 2011. However, according to popularly used openness criterion (export plus import to GDP ratio) Pakistan ranked 109 out 112 countries analyzed based on 2010 annual data from International Financial Statistics (IMF). Only three countries more close than Pakistan were Japan, US and Brazil. Most open economy was found to be China with trade volumes more than four times her income.

overall food inflation, and which contributes to overall inflation more than its weight in the Pakistan's CPI basket. Contribution of food inflation (YoY) has been about 51 percent in overall inflation (YoY) during July 2002 to July 2011 as against it weight around 40 percent. Interestingly, there is no difference in this contribution share during pre and post 2008 global commodity prices shock notwithstanding higher levels, of both food as well overall inflation in Pakistan, in the later period. Within food group, only a handful of items (wheat and allied products, sugar and gur, meat, fresh milk, and vegetables) contributed to half of the food inflation in Pakistan during both the pre and post 2008 commodity prices shock (see Figure 7).[5] It means spread of inflation has been limited to a few commodities in Pakistan. This can also be seen from Figure 8 with the help of inflation diffusion indices, based on MoM changes in the prices at micro level, for food as well as non-food group for the case of Pakistan. Food inflation diffusion has been lower, than for non-food group, on average during both the pre and post international commodity prices shock of 2008. Food inflation diffusion reaches the levels of non-food inflation diffusion only during the FY08, the year of global commodity price shock. We can see that IDI for food group has been more volatile than for non-food group. We now turn to volatility in food inflation in Pakistan.

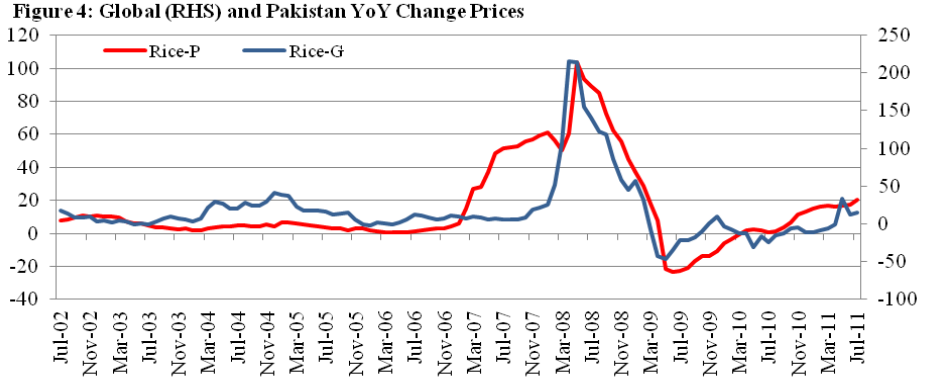
Figure 3: Global (RHS) and Pakistan YoY Change Prices



Source: IMF, Pakistan Bureau of Statistics, and author Calculations

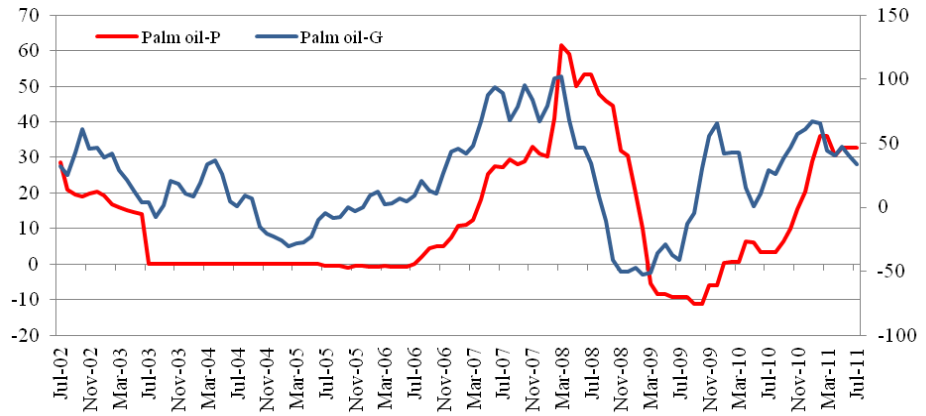
[5]Historic growth in the wheat prices occurred in Pakistan when government increased wheat (support) price by 52 percent in FY10, to Rs. 950 per kg, that too over and above 47 percent raise given just a year earlier (in FY09). This (123.53 percent) wheat price inflation in 'two years' is almost double than earlier highest 'two years' wheat price inflation at 64.4 percent during 1974-76. Going into the details of resultant transfer of money from urban to rural population of the country and subsequent implications for the economy as a whole is out of the scope of this note.

Figure 4: Global (RHS) and Pakistan YoY Change Prices



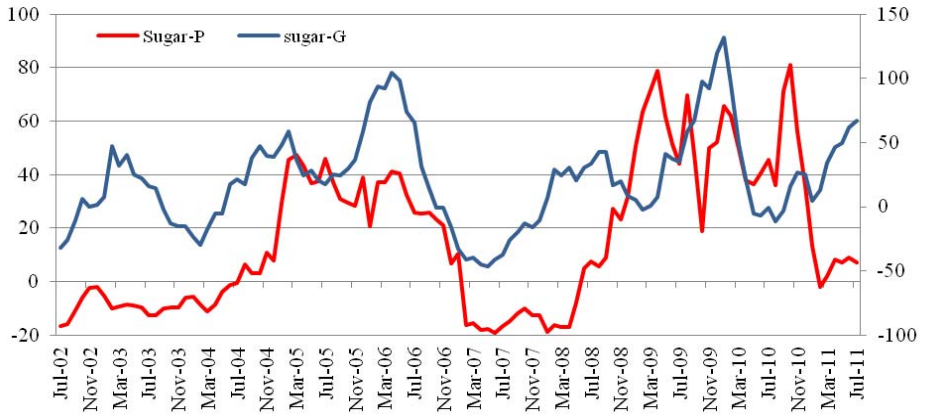
Sources: IMF, Pakistan Bureau of Statistics,, and author Calculations

Figure 5: Global (RHS) and Pakistan YoY Change Prices



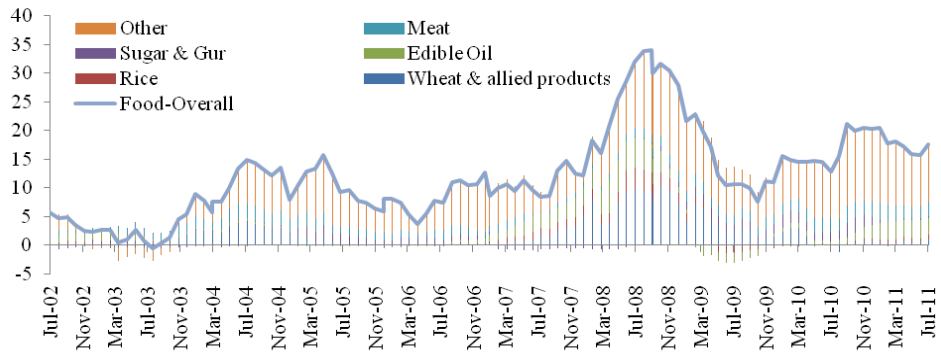
Source: IMF, Pakistan Bureau of Statistics, and author Calculations

Figure 6: Global (RHS) and Pakistan YoY Change Prices



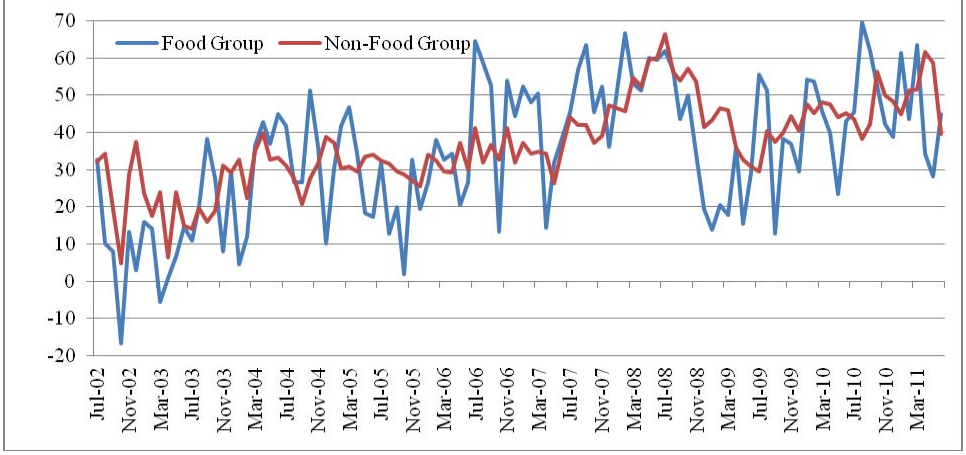
Source: IMF, Pakistan Bureau of Statistics, and author Calculations

Figure 7: Commodity Level and Food Group YoY Inflation in Pakistan



Source: Pakistan Bureau of Statistics, Author Calculations

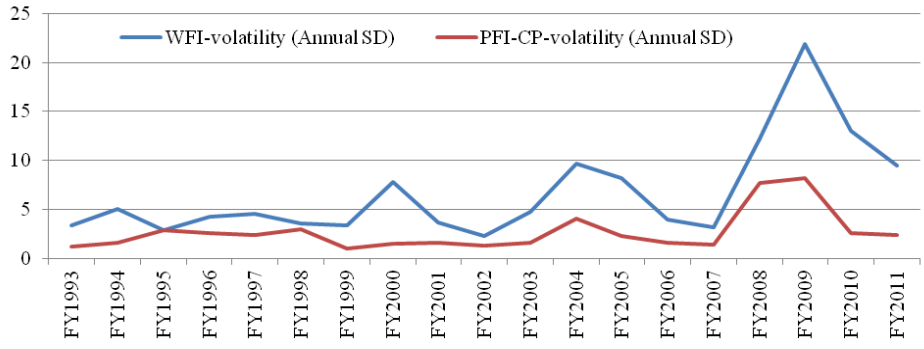
Figure 8: Inflation Diffusion in Pakistan



These are not only the levels of food price changes in world and Pakistan which are linked, the volatilities in the two markets are also linked as has been shown in the Figures 9 and 10. Though on average volatility in food inflation in Pakistan was half of that in the world food inflation, much lower part of the global food inflation volatility was passed on to the Pakistani markets during the 2008 commodity price shock. This holds irrespective of whether we see the MoM or YoY food price changes. Here, another important question arises: is world food inflation comparable to WPI food inflation in Pakistan rather than retail markets food inflation in the country? It was our wholesale markets which absorbed most of the volatilities in the food prices. We can see, during the last four years particularly, volatility in our wholesale markets was higher (than those in the retail markets) but still lower compared to global market as shown in Figure

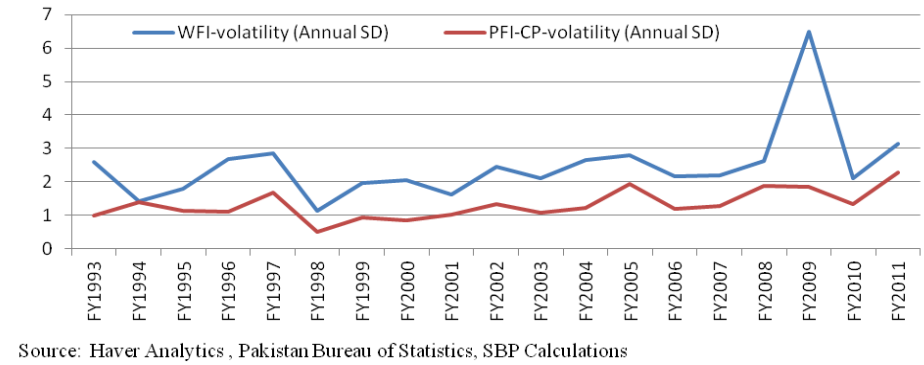
11. We know that prior to the commodity prices shock of 2007-08, volatility in our retail and wholesale market was almost at same levels but during the shock times our wholesale market worked as shock absorber. However, the food inflation volatility persistence was found to be higher in case of Pakistan compared to world food inflation volatility persistence. We also explored the food inflation persistence in Pakistan at levels. That is where we now turn to (see Table 3).

Figure 9: Annual SDs - Pakistan and World Food&Beverages Inflation (YoY)



Source: Haver Analytics , Pakistan Bureau of Statistics, SBP Calculations

Figure 10: Annual SDs - Pakistan and World Food & Beverages Inflation (MoM)



Source: Haver Analytics , Pakistan Bureau of Statistics, SBP Calculations

It is well established that the effectiveness of monetary policy in stabilizing prices depends largely upon inflation dynamics – in addition to the credibility of the central bank, the level of cooperation between monetary and fiscal policies, the exchange rate regime and the degree of aggressiveness of monetary policy. One of the determinants of inflation dynamics is the price setting behaviour of firms in the country. When a significant number of firms adjust their prices based on past information, the country faces inflation persistence (Gali and Gertler, 1999) – the tendency of

inflation to converge slowly to its long-run level following a shock. Choudhary *et al.* (2011), based on a survey of a large number firms in Pakistan by State Bank of Pakistan (SBP), found that 71 percent of manufacturers in the country used backward looking information in price setting. This gives rise to inflationary inertia as when a large proportion of firms use backward looking information while setting prices, inflation cannot transition (easily) to a (new) lower steady state in response to any unexpected announcement of a, permanent and, credible lowering of growth in the nominal anchor (Fuhrer, 2009).

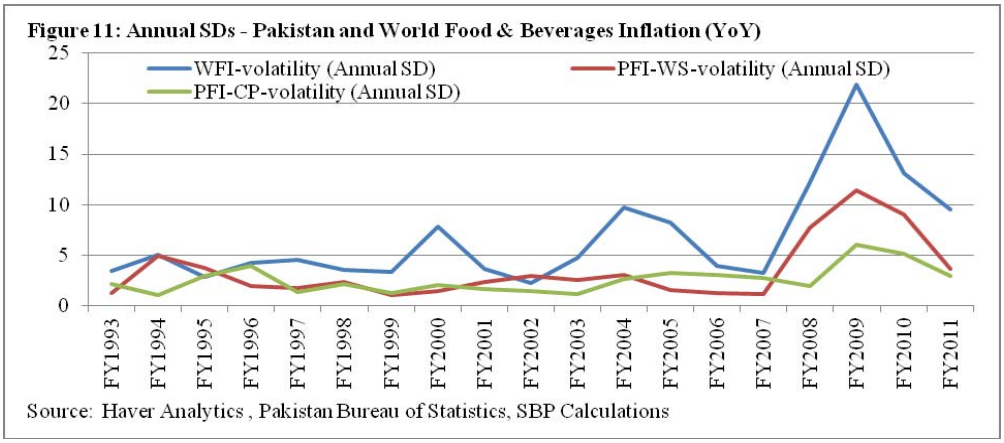


TABLE 3

Inflation Persistence and Inflation Volatility Persistence – Pakistan and World

	Period	AR(1) coefficient for MoM inflation series	AR(1) coefficient for squared MoM inflation series
(1)	(2)	(3)	(4)
Pakistan	Jan 1992-Dec 2011	0.11	0.33*
World	Jan 1992-Dec 2011	0.39*	0.21*

*Significant at 5 percent critical level.

Hanif *et al.* (2012) explored (intrinsic) inflation persistence in Pakistan using month on month time series data of consumer price index (CPI) for 2001-11, various group level consumer price indices, and 374 individual prices, released by the Pakistan Bureau of Statistics (PBS) – the country's statistical agency. They found the evidence of core (non-food-non-energy) inflation persistence in Pakistan but they could not find any evidence of food

inflation persistence in Pakistan during the last decade. Core inflation basket is dominated by manufacturing goods. Core inflation persistence confirms earlier observation in price setting survey by the State Bank that 71 percent of manufacturing firms in Pakistan used backward looking information in setting prices of the goods produced. But, did inflation persistence or its absence at group level imply that all commodities in it showed similar behaviour? Obviously, it might not be a necessary case. And that was what was found for the case of food group in Pakistan, in particular. When inflation persistence in Pakistan based on individual commodities was further explored, it was found that more than half of the goods in 'food beverages and tobacco' group showed significant inflation persistence. It was observed that more than 80 percent of goods showing inflation persistence in food groups were manufactured food items. Compared to it, only 40 percent of those which were not showing inflation persistence belonged to manufactured food items. It showed that, these were again the manufactured items in which inflation was found to be persistent in Pakistan.

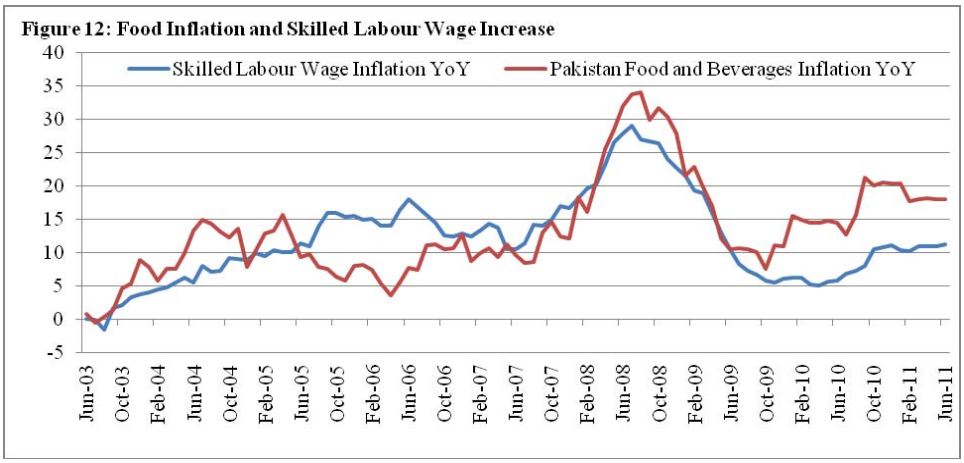
In the beginning it was suggested stating that the food inflation hurts poor more than rich instead of saying that inflation hurts poor more than rich. Let us see what happened to wages in Pakistan, particularly of labour class when country faced world commodities prices shock of 2008. With the help of comparison of food inflation with wage increases for skilled and unskilled labour (Figures 12 and 13) we can see that labour are at disadvantage. During the period of July 03 to June 2011 inflation in food prices (179.80 percent) was higher than the growth in the wages of skilled labour (154.53 percent) but slightly lower than the unskilled labour wage increase (186.63 percent). However, on average the food price inflation during this period was higher than the average wage change during the same period (see Figures 12 and 13). If we consider the period when country faced relatively high food inflation as a consequence of global food price shock after FY08 we can see that in each of the last four years food inflation was higher than the wage growth (see Table 4). It is not only the growth in the wages of skilled and unskilled labour which lagged behind the food inflation; the story of minimum wages for unskilled workers was not different. The minimum wage increased by 433.3 percent during FY1993 (at Rs.1500 per month) to FY2012 (at Rs. 8,000 per month) as against rise in the food prices by 511.07 percent during first month of FY1993 to first month of FY2012. Unfortunately, a significant proportion of employed (unskilled) labour has been earning less than the minimum wage announced by the government from time to time (see Irfan (2008), page 29). In this way, lack of complete implementation of the minimum wage (regulation) and the sluggish growth

in minimum wage itself, even where implemented, failed to neutralize the impact of inflation and thus to protect the living standards of labour.[6] We all know the weights in CPI basket for food group are representative of all income groups in the country and lowest income group has highest share of food expenditure compared to all other income group. People falling in this group are thus most affected when their wages are not even compensated for the rise in food prices despite the fact that food price inflation has been higher relative to overall inflation in Pakistan. That is what we discuss now.

TABLE 4

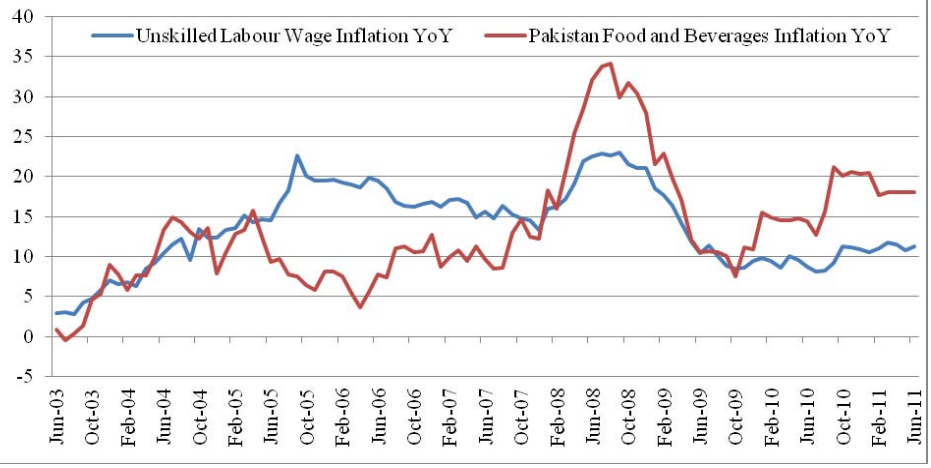
Food Inflation and Wages Increase in Pakistan (%)

	Food Inflation	Skilled Labour	Unskilled Labour
Jul 03-Jun 11	179.80	154.53	186.63
Jul 07-Jun 11	90.38	63.06	61.79
FY08	17.53	18.65	16.85
FY09	24.31	21.26	18.45
FY10	12.47	6.18	9.44
FY11	18.40	9.94	10.51



[6]Here we have not discussed the unprivileged groups of society. Government of Pakistan runs some targeted programmes for supporting these groups including Zakat and Benazir Income Support Programme (BISP). BISP was started in late 2008 which provides Rs. 1,000 per month to (some of the) poorest of the poor families in the country. The amount, however, has not been increased by the government despite more than 50 percent increase in food price index since then. Furthermore, there are some institutional arrangements (through Utility Stores Corporation of Pakistan) for provision of necessary food items at significantly lower than market prices for poor families.

Figure 13: Food Inflation and Unskilled Labour Wage Increase



If we consider the last two decades' observed change in the relative prices we can find the commodities in which price changes have been higher than the average price change in the country. Thus, we can look at the relative price changes at commodity level for all the commodities in the CPI basket. But, it may be difficult to extract any meaningful result from the detailed presentation of MoM or YoY change in relative prices of each of the commodities in the basket. However, it will be useful if we look at (both MoM and YoY) observed change in relative prices for various groups in the CPI basket as in Table 5. Positive (negative) relative price change means inflation in the group has been higher (lower) than the overall inflation in the country. It is obvious from the Table 5 that the 'food beverages & tobacco (FBT)' price inflation has always been higher than overall inflation in Pakistan and that 'fuel & lighting' or 'transport & communication' has usually been the second such group showing higher than overall inflation in Pakistan. We have already seen that Pakistan food price inflation follow world food prices changes. It is also obvious that the inflation dynamics of 'fuel & lighting (F&L)' and 'transport & communication (T&C)' groups are, in one way or other, linked to global crude oil prices behaviour since we are heavily dependent upon crude oil imports. Expected find in Table 5 is the size of the (weighted) average price change in food group inflation after the global commodity prices shock of 2008. Whether we look at MoM or YoY inflation we can see that the (weighted) relative price change in food group inflation during FY08-FY11 is three fold than the same observed during the earlier part of 2000s and many fold compared to what we observed in the 1990s. Supply side factor(s) and/or elasticities of demand are behind this observed phenomenon as commodities in the FBT, F&L and T&C groups are

more prone to supply shocks and tend to be less price elastic compared to those in other groups. In the next discussion we see how much of overall inflation in Pakistan is supply side driven. But before we explore the role of supply side factors in overall inflation let us see how food price inflation impacts non-food price inflation in Pakistan.

TABLE 5

Group-Wise (Weighted) Relative Price Changes in Pakistan during the Last Two Decades

Groups	MoM			YoY		
	FY92-FY00	FY02-FY07	FY08-FY11	FY92-FY00	FY02-FY07	FY08-FY11
Food Beverages and Tobacco	0.0161	0.0421	0.1033	0.1181	0.4831	1.4668
Apparel, Textile and Footwear	–0.0052	–0.0105	–0.0192	–0.0739	–0.1735	–0.2553
House Rent	–0.0083	*0.0000*	–0.0514	–0.1414	0.0222	–0.6023
Fuel & Lighting	*0.0025*	–0.0012	*0.0035*	*0.1029*	–0.0040	*0.0532*
Household Furniture and Equipment	–0.0033	–0.0036	–0.0127	–0.0384	–0.0553	–0.1697
Transport and Communication	–0.0012	–0.0043	–0.0011	0.0213	*0.0504*	–0.1367
Cleaning, Laundry and Personal Appearance	0.0002	–0.0104	–0.0018	0.0033	–0.1503	–0.0756
Medicare	–0.0009	–0.0043	–0.0048	0.0082	–0.0642	–0.0763
Recreation and Entertainment		–0.0041	–0.0047		–0.0548	–0.0593
Education		–0.0037	–0.0111		–0.0534	–0.1447

Note: 1. Entries which are bold show highest relative price change. Entries which are bold and italics show second highest relative price change.

2. During 1990s, there were 8 groups in the CPI basket of Pakistan. 'Recreation and Entertainment,' and 'Education,' were added in 2001).

3. Iqbal and Hanif (2012) found that the estimated coefficients of changes in relative prices of all groups are significantly different from zero.

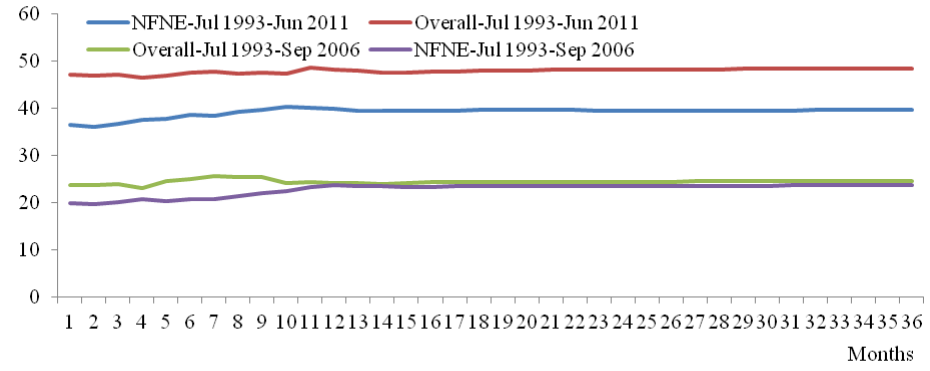
In addition to (direct) impact of food inflation upon overall inflation being a component, rather highest weight carrying group amongst various groups in Pakistan CPI basket, there are some pass through (indirect effect) from food inflation to non-food inflation and thus to aggregate inflation. One of such (second round effect's) channels is the higher wage demand by wage

earners, in response to higher food inflation in the country, which results in cost-push inflation. Another channel may be the expectations channel: agents may form higher future overall inflation expectation and set prices and wages accordingly. Finally, the credibility channel: when people, while experiencing high food inflation, consider the central bank's ability to tame inflation inadequate and expect higher future inflation and behave accordingly in the product and labour markets. Since share of food inflation is large in developing countries like Pakistan (compared to developed world), the direct and direct effect of higher food inflation upon non-food and finally upon general inflation is even larger. Quantification of first round impact of food inflation upon overall inflation is directly an accounting exercise and is relatively simple. With higher food inflation, its direct impact upon inflation increases according to its share in our CPI basket. Quantification of second round impact, however, requires an econometric exercise as in World Economic Outlook (IMF) 2007 which is based upon a VAR model consisting of three endogenous variables (domestic food prices, non-food prices and broad money year on year changes) and two exogenous variables (global food and international crude oil prices year on year changes). Estimated results (impulse response function) for Pakistan for January 1991 to December 2007 period show that a 1 percentage point increase in food price inflation results in 0.24 percentage point increase in non-food inflation and this impact is seen in about 21-24 months. Given the weight of food group in overall inflation and lagged indirect impact of food prices upon non-food prices, the combined effect of food inflation upon overall inflation is significant. This seemingly small number of 0.24 is greater than 10 times (0.02 percentage) impact upon inflation in response to 1 percentage point increase in food inflation in ten Asian economies [as documented in Cheung *et al.* (2008)]. This significant impact of food price inflation in Pakistan (0.24) doubled (to 0.48) after international commodity shock of 2008 to with period halved from 21-24 month (for January 1991 to December 2007 period) to 11-12 months (for January 1991 to December 2011 period).

For overall inflation, the monetarist view that inflation is always and everywhere a monetary phenomenon (Friedman, 1963, p. 17) is widely accepted in the economic literature as a long term proposition. Accordingly, monetary policy framework in Pakistan, as in most of the advanced economies, is primarily designed around the monetarists view. If we consider the long term (average) behaviour of broad money, income, and inflation for 1951-2010 we can see that inflation in Pakistan has been roughly equal to rate of broad money growth minus the real output growth. Even the standard deviation (a measure of volatility) of inflation during this period has been

same as that of broad money growth. Riazuddin (2008) has explored how money growth has interacted historically with inflation in Pakistan, in a bit more detail, and found that inflation is primarily a monetary phenomenon. Considering below (above) median M2 growth and inflation as low (high), he found that three-fourths times high broad money growth was followed by high inflation next year and not surprisingly low broad money growth was followed by low inflation next year with similar odds during 1958-2007. He also found that food inflation too is a monetary phenomenon in Pakistan in the long run. However, it has also been found in some other studies that the supply side factor also play role in driving inflation in the case of Pakistan, especially the food inflation. That is what where comes in the structuralists' point of view on inflation. Bilquees (1988) was the first to explicitly test the monetarist and structuralist views of inflation for the case of Pakistan. She found the debate on monetarists versus structuralists 'relevant' for the developing countries like Pakistan. Khan and Schimmelpfennig (2006) also found the role of supply side factors in explaining short run dynamics of inflation in Pakistan. Besides these studies State Bank of Pakistan has also been pointing out from time to time, in its flagship publications like annual and quarterly reports and in monetary policy statements, the supply disruptions as one of the explanations of inflationary pressures in the country.

Figure 14: Countribution of Supply Side Factors in NFNE and Overall Inflation (%)



Source: Khan and Hanif (2012) and Khan (2008)

We cannot understand inflation in developing countries without considering the supply side factors. And, in case of food inflation these are the supply side factors which are of more importance at least for the case of Pakistan. Using structural vector autoregression (SVAR) approach upon the monthly data of macroeconomic indicators (see Khan and Hanif (2012) for

the list of variables) for July 1993 to June 2011 for the case of Pakistan, it was found that one sixth of the impact of a supply shock on overall inflation occurs in contemporaneous month and three fourth of the overall impact of a supply shock on aggregate inflation occurs during the first year of the shock. It reaches to 85 percent during the 18 months and it completes in almost 36 months. Based on the same dataset set for July 1993 to June 2011, it was found that 39.50 percent of variation in non-food non-energy (NFNE) inflation in Pakistan is explained by the supply shocks. However, the role of supply side factors in explaining overall inflation is higher by more than one-fifth to 48.30 percent (see Figure 14). These supply side contributions in explaining inflation are relatively higher than our previous knowledge on Pakistan economy based upon same dataset but excluding the last 5 years when around 24 percent of the variation in (NFNE as well as overall) inflation were attributable to supply side factors as documented by Khan (2008). It shows the havoc played to inflation in Pakistan by the recent international commodities prices shocks and Pakistan's 2010 flood and 2011 heavy rains. Moreover, supply disruptions due to law and order situation have also increased during the past five years. The crux of the story is inflation (and even NFNE inflation) cannot be termed as purely a monetary phenomenon at least in the case of Pakistan and particularly during the recent history.

V. CONCLUDING REMARKS

Most important findings of this study can be summarized by saying that food inflation is a global phenomenon and that the food inflation hurts poor more than the rich. It was found that Pakistan and world food inflation co-moved, and that global food inflation caused food inflation in Pakistan during the last two decades. However, there was a small basket of food items (wheat, sugar, meat, fresh milk, and vegetables) inflation in which resulted in food inflation in Pakistan. That is why food inflation diffusion in Pakistan had been lower, than for non-food group. Food inflation in Pakistan and world were found to be linked not only at the levels but also in terms of volatilities. Our wholesale markets had been absorbing a part of the volatility in global food inflation, particularly during the post 2008 international commodity prices shock period, and thus volatility in (retail) food inflation in Pakistan had been half of that found in the global food price increases. But, persistence in food inflation volatility in Pakistan had been higher compared to the persistence in the world food inflation volatility. When we compared the phenomenon of persistence in inflation (at level) we could not find any evidence of food inflation persistence in Pakistan whereas global food

inflation was found to be persistent. However, when explored at the individual commodity level, it was found that manufactured food items showed significant inflation persistence in Pakistan during July 2001- June 2011. To explore the impact of the recent food inflation in Pakistan upon labour class (being most vulnerable to food inflation), a comparison was made between the food inflation and wage increases of the labour class. With the help of comparison of food inflation with wage increases for skill and unskilled labour (during the period of July 03 to June 2011) we found the poor (labour class) at disadvantage during most of the period for which the consistent data on wages was found. During each of the last four years (of post 2008 crisis period) food inflation had been higher than the (labour class) wage growth. Higher food inflation (compared to non-food) is not only a post 2008 phenomenon. During the last two decades, food group prices increased most compared to increases in price of any other group in CPI basket; following fuel & lighting and transport & communication groups. Commodities in these three groups are more prone to supply shocks and tend to be less price elastic compared to other commodities in our CPI basket. Based on the monthly dataset of macroeconomic indicators for July 1993 to June 2011 for the case of Pakistan, it was found that 48 percent of variation in overall inflation in Pakistan is explained by the supply shocks compared 24 percent found by Khan 2008 based on July 1993 to September 2006 dataset. It showed the havoc played to inflation in Pakistan by the supply factors like international commodities prices shocks, last year's heavy rains, and flood a year earlier.

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FOREIGN DIRECT INVESTMENT AND CURRENT ACCOUNT BALANCE OF PAKISTAN

ATIF ALI JAFFRI, NABILA ASGHAR, MAHNAZ M. ALI
and ROOMA ASJED*

Abstract. This study investigates the impact of foreign direct investment (FDI) inflows on current account balance excluding current transfers (CABECT), and income outflows (IO) of balance of payments (BOP) of Pakistan for the period 1983-2011 by employing autoregressive distributive lag (ARDL) approach. Total FDI inflows in Pakistan from 1983 to 2011 were US $ 32.26 billion out of which 72.03 percent (US $ 23.23 billion) were received in last seven years (2005-2011) mostly in the services sector. Results of the study show that increase in FDI causes increase in IO and worsens CABECT of Pakistan in the long-run. Error correction terms in both short-run models have negative and significant coefficients thus confirming long-run relationship of FDI inflows with IO and CABECT.

Keywords: Current account balance, Foreign direct investment, ARDL approach

JEL classification: C23, F21, F32

I. INTRODUCTION

Foreign Direct Investment (FDI) is considered to be an important source to build up physical capital, create employment opportunities, develop productive capacity, enhance skills of local labour and managers through

*The authors are, respectively, Assistant Professor/Head, Department of Economics, University of Gujrat, Gujrat; Ph.D. scholar, Department of Economics, Government College University, Faisalabad; Lecturer in Economics, University of Gujrat, Gujrat; and Associate Lecturer in Economics, University of Gujrat. Gujrat (Pakistan).
Corresponding author e-mail: nabeelakhan83@gmail.com.

transfer of technology, and integration with rest of the world.[1] According to State Bank of Pakistan (SBP) data on International Investment Position, total stock of FDI in Pakistan up to the end of year 2011 was US $ 21.88 billion (see Table 1). Figure 1 shows that annual FDI inflows in Pakistan remained less than US $ 1 billion up to year 2003. Annual FDI inflows in year 2007 and 2008 were recorded US $ 5590 million and US $ 5438 million respectively.

TABLE 1

International Investment Position of Pakistan (Million US$)

International Investment Position Components	Stock as on 31 December				
	2007 (R)	2008 (R)	2009 (R)	2010 (R)	2011 (P)
International Investment Position – net	(50,754)	(52,298)	(54,822)	(59,164)	(61,366)
A. Assets	22,769	17,993	23,374	26,158	26,564
1. Direct investment abroad	1,249	1,960	1,851	1,362	1,432
2. Portfolio investment	330	142	153	178	192
3. Financial derivatives	–	–	27	21	11
4. Other investment	5,654	6,258	6,203	6,649	7,309
5. Reserve assets	15,536	9,633	15,140	17,949	17,620
B. Liabilities	73,523	70,291	78,196	85,322	87,930
1. Direct investment in Pakistan	25,621	16,473	17,674	19,828	21,876
2. Portfolio investment	6,767	4,723	3,548	4,488	4,014
3. Financial derivatives	–	–	57	51	41
4. Other investment	41,135	49,095	56,917	60,955	61,999
of which Loans	*39,038*	*46,602*	*51,605*	*55,194*	*56,231*

Source: State Bank of Pakistan

The decline in FDI in Pakistan after 2008 was mainly due to deteriorated law and order situation, political instability, energy crisis, weak economic activity along with global recession. A detailed analysis of FDI reveals that

[1]According to Balance of Payment Manual 05 (BPM-05) FDI is the category of international investment that reflects the objective of a resident entity in one economy obtaining a lasting interest in an enterprise resident in another economy.

major decline was recorded in telecommunication and oil and gas exploration sectors. The decline in telecom is obvious as this sector has already reached a saturation point in the country. In case of the oil & gas exploration, a growing circular debt and the deteriorating law & order situation seem to be the major hurdles in attracting fresh FDI.

FIGURE 1

FDI Inflows in Pakistan Since CY 1983 (Million US $)

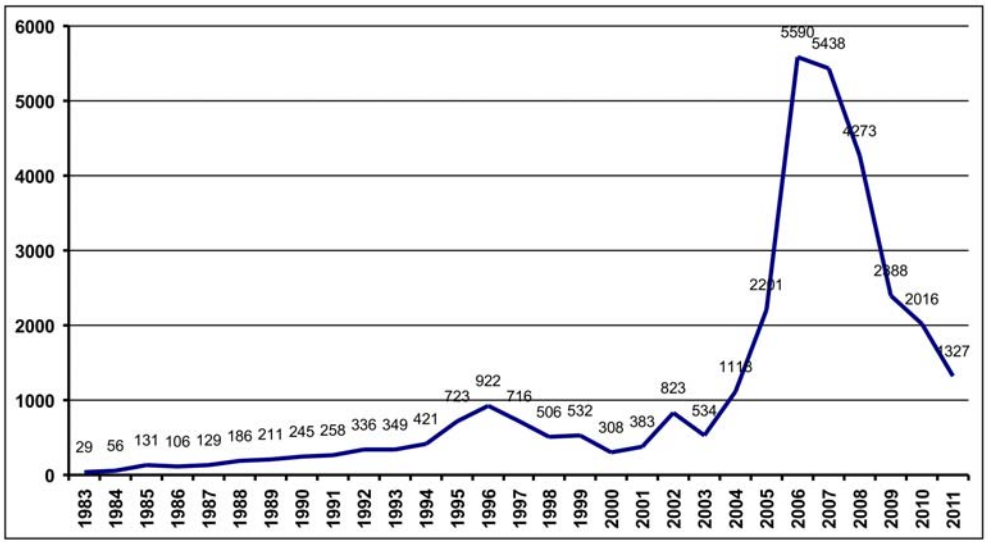
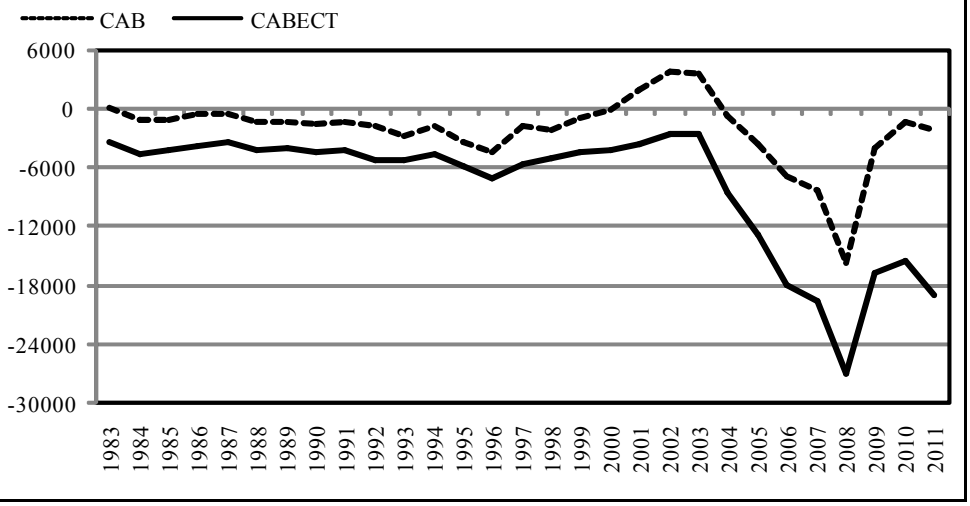
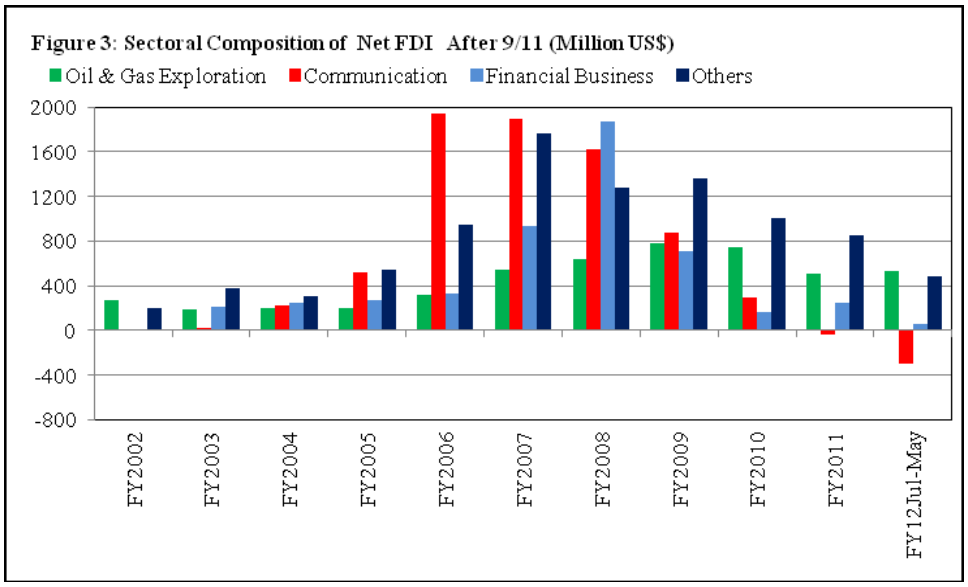


Figure 2: Current Account Balance and Current Account Balance Excluding Current Transfers Since CY1983(Million US$)





FDI inflow is accounted as credit entry in the financial account of balance of payment (BOP) thus having direct positive impact on BOP. However, increasing volume of FDI also increases the size of imports and profit repatriation. There is a large body of empirical literature showing positive effects of FDI on receiving country's economy including transfer of technology, employment creation, growth enhancement and tax collection. However, relatively less focused area is related to problems resulting due to FDI inflows in small open economies like Pakistan. FDI inflows in developing countries may cause exchange rate appreciation (Dutch disease), trade and income account balance worsening thus having serious implications for overall balance of payments and foreign exchange reserves.

In case of Pakistan, a number of studies have been conducted to estimate relationship of FDI inflows with GDP growth, poverty and inequality, domestic investment, exports and other macroeconomic variables. But no previous study has investigated the impact of FDI on current account balance. To fill the gap in existing literature for Pakistan, this study investigates the impact of FDI inflows on CABECT and IO of balance of payments (BOP) of Pakistan for the period 1983-2011 by using autoregressive distributive lag (ARDL) approach.[2]

[2]The reason for starting data period from 1983 is that before 8th February 1982 SBP was practicing fixed exchange rate regime.

II. LITERATURE REVIEW

Considerable amount of available literature on FDI helps in scrutinizing different aspects of FDI as observed throughout the world. Hossain (2007) showed that the initial impact of an inflow of FDI on BOP is positive but the medium term effect could become either positive or negative as the investors increase their imports of intermediate goods and services, and begin to repatriate profit. Jansen (1995) argued that the impact of FDI on the current account has become complicated by the investment income payments that arise from FDI.

Lehman (2002) found that structural change in external accounts of a country takes place due to FDI inflows. Trade openness and host country risks are found to increase affiliate profitability of FDI and earning repatriations are not determined through constant dividend payout ratio. Using data for the period 1996-2000 of Brazil and Argentina the study observed that FDI was responsible for causing huge income and profit repatriations that had caused current account deficit in both countries.

Woodward (2003) claimed that FDI flows have contributed substantially to current account deficits. Using data of six economies the results of the study showed that FDI was one of the main factors responsible for current account deficit in these countries. By making FDI analogous to loan, the study argued that subsequent repatriation of the capital from the recipient country was same as repayments of loan.

Demekas *et al.* (2005) concluded that the benefits of FDI had long been recognized for the host countries, including knowledge and technology transfer to domestic firms and the labour force, productivity spillovers, enhanced competition, and improved access for exports abroad, notably in the source country

Kumar (2007) concluded that FDI inflows appeared to be risky for developing countries' economies. FDI being foreign capital led to capital flight in times of extreme financial crisis. The study concluded that FDI may be accompanied with distress sale of domestic assets and proved harmful for the economy. The profits earned through the investment were repatriated to the countries of origin of that foreign investment that had exerted bad impact on current account balance.

Mencinger (2008) discussed that the bigger the inflow of FDI led to higher current account deficit as FDI drives local competitors out of business, increases imports and decreases the efficiency acquired by firms from multinational firms. Bhagwati (1998) claimed that impact of FDI on

growth appeared to be positive in case of export promoting countries not in case of small developing economies. This study also revealed that the FDI to GDP ratio and current account balance to GDP ratio of eight transition economies had shown a negative relationship.

A few studies have been conducted to examine the nature and direction of causal relationship between FDI inflows and current account balance in case of Pakistan. A causal relationship between FDI and current account was checked by Siddiqui and Ahmad (2007). They investigated the long-run causal relationship between FDI inflows and current account deficit on quarterly data for Pakistan economy over the period 1976-2005. The Johansen co-integration method and vector error-correction model technique were used for examining the long-run and the short-run dynamics of system respectively. The results indicated only long-run uni-directional causality from FDI to CA. Not much studies are available in the literature that have analyzed the impact of FDI on current account balance of Pakistan. This study is an attempt to analyze empirically the impact of FDI on current account balance of Pakistan. This study may help the policy makers to formulate economic policies consistent with the economic conditions of the country for attracting FDI in Pakistan.

III. METHODOLOGY AND RESULTS

In order to empirically analyze the impact of FDI inflows on income outflow and current account balance of Pakistan, the following models have been utilized:

$$\underset{}{\text{LIO}} = \underset{(+)}{f(\text{LFDI})} \tag{1}$$

$$\underset{}{\text{CABECT}} = \underset{(-)\quad(-)\quad(+)}{f(\text{FDI, DUM2008, DUM9/11})} \tag{2}$$

The variables incorporated in the first model are: natural Log of Income Outflow (LIO) as a dependent variable and Natural Log of Foreign Direct Investment (LFDI) as an independent variable. The variables used in the second model are: Current Account Balance Excluding Current Transfers (CABECT) as dependent variable and Foreign Direct Investment (FDI) as independent variable. The expected signs of coefficients are presented in parenthesis. Calvo *et al.* (1996) argued that capital inflows are negatively related to current account balance. This indicates that a fall in interest rate induces increase in consumption and widens the current account deficit. For capital importing country, a decline in interest rate make further borrowing cheaper, leading towards high consumption and deteriorating CAB (for

details, see Irving Fisher Model). Thus, standard open economy models suggest that increased capital inflows are likely to be accompanied by a rise in consumption and investment, and a widening in the current account deficits.

The stationarity of the variables is examined to avoid the existence of spurious estimation results. For this purpose ADF and PP tests are used for observing the order of integration of the variables.

The unit root results obtained from ADF and PP tests are presented in Tables 2 and 3 respectively.

TABLE 2

Augmented Dickey Fuller Test

Series	At Level		At First Difference	
	With intercept	With trend and intercept	With intercept	With trend and intercept
Model 1				
LIO	–1.81(0)	–2.81 (2)	–3.90(0)***	–4.06(0)**
LFDI	–2.35(0)	–3.65(3)*	–3.91(0)***	–4.07(0)**
Model 2				
CABECT	–0.78 (0)	–1.83(0)	–5.05(0)***	–4.39(4)**
FDI	–2.37 (1)	–4.30 (6)**	–4.82(6)***	–5.23(6)***

***, **, * denote the significance of test statistics at 1 percent, 5 percent and 10 percent level of significance respectively against the null hypothesis of unit root. Figures in the parenthesis represent the lag selection based on Schwarz Information Criterion (SIC).

Table 2 and 3 show that the order of integration of the variables in the model is not suitable to apply the conventional Johansen' cointegration techniques as results do not fulfill its prerequisite of same order of integration of the variables. In this situation, Pesaran *et al.* (2001) proposed an approach for testing the existence of long-run relationship among variables which is applicable irrespective of having different order of integration among variables.

ARDL approach is basically based upon two steps. At first step, F-statistic values are calculated through Wald test restrictions for checking the

presence of cointegration among the variables and in the second step, long-run and short-run dynamics of the model are observed.

TABLE 3

Phillips Perron Test

Series	At Level		At First Difference	
	With intercept	With trend and intercept	With intercept	With trend and intercept
Model 1				
LIO	–0.50(1)	–1.702(1)	–3.896(1)***	–4.06(1)**
LFDI	–2.270(2)	–2.292(2)	–3.86(1)***	–4.05(1)**
Model 2				
CABECT	–0.796(1)	–1.872(1)	–5.048(0)***	–5.06(0)***
FDI	–1.833(2)	–2.148(3)	–3.159(0)**	–3.11(0)

***, **, * denote the significance of test statistics at 1 percent, 5 percent and 10 percent level of significance respectively against the null hypothesis of unit root. Figures in the parenthesis represent the lag selection based on Schwarz Information Criterion (SIC).

TABLE 4

Lag Selection Criteria Based on
Vector Autoregressive Model (LIO, LFDI)

Lag Order	Akaike Information Criterion
0	2.331696
1	–0.792194
2	–0.806042
3	–0.889145
4	–0.893255*

*Akaike Information Criterion selected 4 lags from maximum 4 lags.

TABLE 5

Lag Selection Criteria Based on
Vector Autoregressive Model (CABECT, FDI)

Lag Order	Akaike Information Criterion
0	36.54430
1	34.77636
2	34.63603
3	33.16657
4	33.01115*

*Akaike Information Criterion selects 4 lags from maximum 4 lags.

Based on Vector Autoregressive (VAR) estimation, Akaike Information Criterion (AIC) suggested 4 lags as optimal lag length. So the next step is to apply Wald test (F-Statistics) by imposing restriction on equations (3) and (4) respectively.

$$\Delta LIO = \gamma_0 + \gamma_{1i}\sum_{i=1}^{4}\Delta LIO_{t-i} + \gamma_{2i}\sum_{i=0}^{4}\Delta LFDI_{t-i} + \gamma_3 LIO_{t-1} + \gamma_4 LFDI_{t-1} + \varepsilon_t \quad (3)$$

H_0: $\gamma_3 = \gamma_4 = 0$ (No evidence of long-run relationships)

H_1: $\gamma_3 \neq \gamma_4 \neq 0$ (Existence of long-run relationships)

$$\Delta CABECT = \gamma_0 + \gamma_{1i}\sum_{i=1}^{4}\Delta CABECT_{t-i} + \gamma_{2i}\sum_{i=0}^{4}\Delta FDI_{t-i} + \gamma_3 CABECT_{t-1} + \gamma_4 FDI_{t-1} + \varepsilon_t \quad (4)$$

H_0: $\gamma_3 = \gamma_4 = 0$ (No evidence of long-run relationships)

H_1: $\gamma_3 \neq \gamma_4 \neq 0$ (Existence of long-run relationships)

Bound test for cointegration is presented in Table 6.

TABLE 6

Bound Test for Cointegration

Model Estimated	Model 1 (LIO, LFDI)	Model 2 (CABECT, FDI)
F-Statistics	6.694902**	4.704564*
Selected Lag Length (Criteria)	04 (AIC)	04 (AIC)
Pesaran *et al.* (2001)		
Critical bound values	Lower Bound Value	Upper Bound Value
10%	3.03	4.06
5%	3.47	4.57
1%	4.40	5.72

Critical values are obtained from Pesaran *et al.* (2001), Table CI (V): Unrestricted Intercept and Unrestricted Trend.

Table 6 shows that the calculated F-statistics of model 1 (LIO, LFDI) is greater than upper limits of tabulated F-values at 1 percent level of significance thus providing evidence for cointegration. Seabra and Flach (2005) also reported the same results by rejecting the null hypothesis of no co-integration between the FDI inflows and profit repatriation for Brazilian economy by using the Johansen cointegration (maximal eigenvalue) technique.

In the second model (CABECT, FDI) calculated F-statistics is greater than the upper limits of tabulated F-statistics at 5 percent level of significance which confirms the presence of cointegration among the variables in model 2. Similar results are reported by Siddiqui and Ahmad (2007) in case of Pakistan for quarterly data of CAB and FDI for the period 1976-2005 by employing the Johansen (1988) and Johansen and Juselius (1990) technique of cointegration.

In the next step, long-run relationship has been observed by applying Ordinary Least Square (OLS) method and results are reported in Table 7.

The long-run coefficients obtained from the ARDL model are reported in Table 7 for model 1. The results reveal that FDI has positive impact on IO and it is significant at 1 percent significance level. The coefficient of FDI shows that one percent increase in FDI inflows may lead to 0.1662 percent increase in income outflows in the long-run. The implication of these findings in case of Pakistan is that the deterioration in income account mainly stemmed from an increase in net interest payments, and repatriation of profit and dividends. Same implication is discussed by Rehman *et al.*

(2010) that FDI inflows in non-tradable sectors have worsened the balance of payments (BOP) problems for Pakistan. To check the goodness of the model diagnostic tests are carried out which include Histogram Normality test, ARCH LM test, Breusch-Godfrey LM test. The statistics reported above for the model 1 (LIO, LFDI) are showing that the residuals are normally distributed having no serial correlation and ARCH effects.

TABLE 7

Long-run Relationship among Variables Model 1

Variables	Dependent Variable: LIO		
	Coefficients	t-values	Probability
C	1.6810***	5.38	0.0000
$\ln IO_{t-1}$	0.6450***	9.59	0.0000
$\ln FDI$	0.1662***	4.70	0.0001
$R^2 = 0.981$ Adj. $R^2 = 0.98$ F-statistics = 641.78(0.0000) Jarque-Bera $Chi^2(2) = 2.37$ (0.3056) Breusch-Godfrey LM $Chi^2(1) = 1.92$ (0.3823) Hetroskedasticity test ARCH = 0.0029 (0.9574)			

*** denote significance level at 1%.

TABLE 8

Long-run Relationship among Variables Model 2

Variables	Dependent Variable: CABECT		
	Coefficients	t-values	Probability
C	–2639***	–6.54	0.0000
$dCAB_{t-2}$	–0.3876***	–5.99	0.0000
FDI	–3.8235***	–8.28	0.0000
FDI_{t-1}	0.9142	1.32	0.2004
FDI_{t-2}	–1.9332***	–4.36	0.0003
$R^2 = 0.96$ Adj. $R^2 = 0.95$ F-statistics = 114.9289 (0.0000) Jarque-Bera $Chi^2(2) = 4.04$ (0.1329) Breusch-Godfrey LM $Chi^2(1) = 0.32$ (0.7294) Hetroskedasticity test ARCH = 2.23 (0.1493)			

*** denote significant level at 1%

Estimated coefficients for long-run relationship of model 2 are presented in Table 8. The results show that FDI inflows have negative impact on CABECT and is significant at 1 percent level of significance.

The diagnostic tests are employed on the long-run relationship of variables in model 2. The results confirm that residuals are normally distributed and there is no serial correlation and ARCH effect.

Short-run dynamics of model (1) and (2) are estimated by using the error correction mechanism (ECM). The results are presented in Table 9.

TABLE 9

Error Correction Representation for the Selected ARDL-Model 1 (0, 2)

Variables	Dependent Variable DLIO		
	Coefficients	t-values	Probability
C	0.0288	1.498696	0.1476
ECM(–1)	–0.4682**	–2.033376	0.0537
DLFDI	0.1518***	3.360217	0.0027
DLFDI(–1)	0.1081**	2.497319	0.0201
R^2 = 0.50 Adj. R^2 = 0.43 SE of Regression = 0.0918 DW Stat = 1.96 Jarque-Bera $Chi^2(2)$ = 0.695 (0.7064) Breusch-Godfrey LM $Chi^2(1)$ = 5.12 (0.080) Engle's ARCH LM $Chi^2(1)$ = 0.69 (0.406)			

Table 9 presents the short-run coefficients estimated from the ECM of ARDL for model 1. The results indicate that LFDI is positively related to LIO and statistically significant at 1 percent level of significance. In short-run, 1 percentage point increase in DLFDI inflow may lead to 0.1518 percentage point increase in DLIO. The coefficient of error correction term (ECM_{t-1}) carries negative sign which is statistically significant at 5 percent level of significance. The value of coefficient of ECM is (–0.46824) implies that error correction process converges to equilibrium with the speed of 46.82% from current to next time period.

Table 10 presents the results of ECM model 2. Results indicate that FDI inflow is negatively affecting CABECT and coefficient of DFDI is statistically significant at 1 percent level of significance. DUM 9-11 and DUM2008 have expected signs and the coefficients are statistically

significant. The coefficient of error correction term reported in the model is negative and statistically significant at 5 percent level of significance which indicates cointegration among the variables. The value of coefficient of ECM is –0.668711 shows that in one year 66 percent error is corrected towards equilibrium.

TABLE 10

Error Correction Representation for the Selected ARDL-Model 2 (0, 4)

Variables	Dependent Variable DCABECT		
	Coefficients	t-values	Probability
C	–22.68	–0.08	0.9402
ECM(–1)	–0.67**	–2.82	0.0118
DFDI	–4.55***	–11.57	0.0000
DFDI(–1)	0.62	1.55	0.1387
DFDI(–2)	0.87*	1.98	0.0645
DFDI(–3)	2.62***	3.22	0.0050
DUM 9-11	3976.83	2.98	0.0084
DUM-2008	–11415	–5.98	0.0000
R^2 = 0.960 Adj. R^2 = 0.945 SE of Regression = 1242.6 DW Stat = 1.77 F-statistic = 59.93389 Prob (F-statistic) = 0.000000 Jarque-Bera $Chi^2(2)$ = 3.30 (0.192) Breusch-Godfrey LM $Chi^2(1)$ = 0.14 (0.8699) Engle's ARCH LM $Chi^2(1)$ = 0.199 (0.6566)			

To check the robustness of the above presented estimation results, diagnostic tests are performed. These tests examine the presence of serial correlation, heteroscedasticity effects and stability of model. The diagnostic tests show that there is no serial correlation and ARCH effect, residuals are normally distributed.

IV. CONCLUSIONS AND POLICY IMPLICATIONS

Existing empirical literature on the impact of FDI inflows in Pakistan is largely influenced by positive aspects thus ignoring negative effects

including implications for current account balance. This study contributes in the existing empirical literature showing negative impacts of FDI inflows in Pakistan. The study finds that in case of Pakistan FDI inflows have worsen CABECT both in the long-run and short-run for the period 1983-2011. Furthermore, by using ARDL approach of cointegration the study finds that FDI inflows have worsen income account of current account balance in Pakistan.

Policy implications on the basis of findings of the study include that government should promote domestic savings and investment along with attracting FDI inflows. Further, sector-wise composition of FDI inflows needs to be diversified from current bias towards services sector.

Future research in this direction may focus sector wise and company wise repatriation of profit and intensity of input imports attached with FDI inflows. Further, it is important to estimate sector-wise impact of FDI on employment generation and tax collection in Pakistan.

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THE IMPACT OF TRANSFORMATIONAL AND TRANSACTIONAL LEADERSHIP STYLES ON THE MOTIVATION OF EMPLOYEES IN PAKISTAN

ABDUL QAYYUM CHAUDHRY, HUSNAIN JAVED
and MUNAWAR SABIR*

Abstract. The role of leadership is very important in building a sustainable business and community organization. The purpose of this study is to find out the association of transformational and transactional leadership with the motivation of employees. The study uses a data consisted of the employees of all private and public banking sector of Pakistan. These banking employees have been randomly selected for ensuring the involvement of various demographic variables. The results of the study show positive and significant relationship between the independent variables transformational and transactional leadership with the dependent variable motivation.

Keywords: Transformational leadership, Transactional leadership, Motivation, Banking sector

JEL classification: M12, M16, M54, N20

I. INTRODUCTION

The effective leadership style certainly improves organizational productivity. Different leaders have their own distinctive leadership styles, that have proved to be closely associated with their organizational performances and

*The authors are, respectively, Assistant Professor, Institute of Education and Research; Master in Commerce; and Assistant Professor, Department of Geography at the University of the Punjab, Quaid-e-Azam Campus, Lahore (Pakistan).
Corresponding author e-mail: qayyum.ier@pu.edu.pk

outputs. Helpful leadership styles are always a part of an organization, where it can confirm to be an asset when a positive kind of planned arrangement is necessary. According to Bass (1985), the transformational leadership style is a systematic way by which subordinates or fellows praise and appreciate their leaders. Resultantly, this style enhances their motivational level, which leads to organizational productivity.

Bass and Avolio (1994) are of the opinion that the transformational leadership produces the interest among the group and followers to observe their occupation through new perspective. Transformational leadership provides the vision mission and consciousness of the industry or any organization which creates the high level of ability and expertise. In addition, that kind of leaders mobilizes the employees to see their own interests that makes the organization fruitful. The growth and determination for sustainability are a need and necessity for approximately every segment.

Therefore, through managers or leaders effective behaviour of an organization can increase its outcome and improve productivity. Without desirable leadership style, it is almost impossible for the firms to achieve their objectives. Therefore, this study will explore that what kind of leadership style is most useful for the organization and then it will be easy to carry on with that style in banking sector of Pakistan.

II. LITERATURE REVIEW

Williams (2009) pointed out that leadership creates understanding and recognition of a group's undertaking, purpose and make the workers to know beyond their own wants and needs for the good of the cluster. The style in which leaders inspire their subordinates is called Transformational Leadership Style (Greenburg and Baron, 2009). Robbins *et al.* (2007) was of the opinion that through contingent reward employees add on the success of a target.

Judge and Piccolo (2004) concluded that there emerges a positive relationship among followers' motivation, transformational leadership and contingent reward.

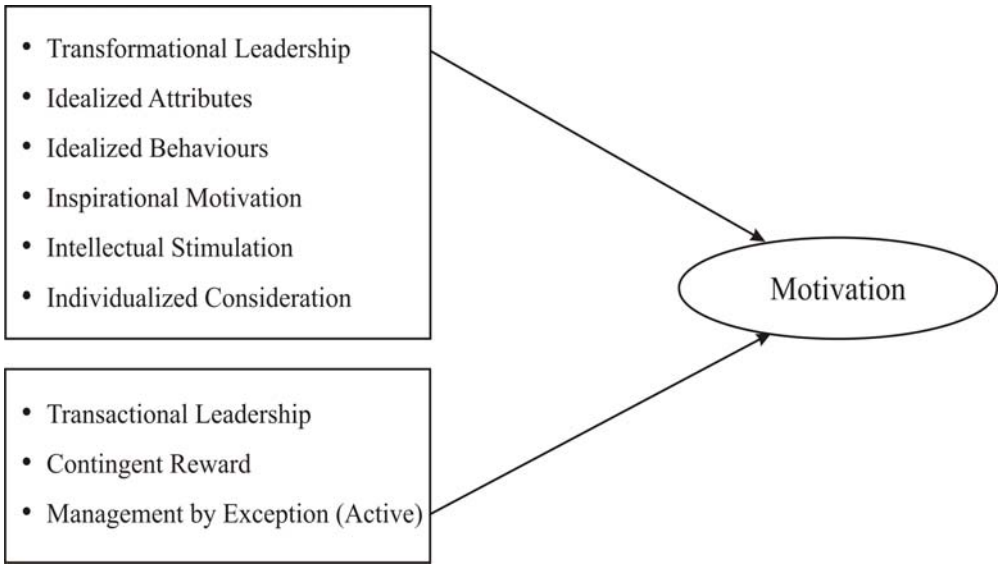
Barbuto (2005) pointed out that transformational leadership and its components have positive and significant association with intrinsic motivation and there is a negative association with individualized consideration. Furthermore, transactional leadership and its components have significant and positive relationship with intrinsic motivation.

Webb (2003) has conducted a study on president's leadership behaviour associated with followers' job satisfaction, motivation toward extra effort in various schools, colleges and universities. The results of the study show that there is significant and positive association between the motivation and transformational leadership. Whereas the contingent reward has significant and positive relationship with motivation while management by exception active and passive have significant and negative relationship with motivation.

This study uses the following model for observing the relationship between transformational and transactional leadership styles on the motivation of banking employees in Pakistan.

FIGURE 1

Relationship between Transformational and Transactional Leadership Styles



III. METHODOLOGY

The present study is descriptive in its nature based upon a personally administered questionnaire. In the light of various studies conducted on this topic, the MLQ was selected to conduct this study. Before conducting the study, a pilot test was conducted to make the instruments more effective. The standardized (MLQ) questionnaires were modified to make it more responsive. Population includes all major demographic variables. Sample of 475 banking employees working in the Punjab Province was gathered

through random sampling. The response rate was approximately above 80% and 26 questionnaires rejected as they were incomplete. Finally 350 questionnaires were selected for analysis purpose.

TABLE 1

Demographic Characteristics of Respondents (N = 350)

Characteristics		N	Percent
Age (Years)	20-24	47	13.43
	25-29	170	48.57
	30-34	66	18.86
	35-39	29	8.28
	40 and above	38	10.86
Experience (Years)	1-4	113	32.29
	5-9	109	31.14
	10-14	78	22.29
	15-19	29	8.28
	20-24	9	2.57
	25-29	5	1.43
	30-36	7	2.00
Level of Job	Entry level	83	23.71
	Middle level	237	67.71
	Top level	30	8.57
Qualification	Graduation	98	28.00
	Master	220	62.71
	Others	32	9.14
Marital Status	Single	170	48.57
	Married	180	51.43
Gender	Male	264	75.43
	Female	86	24.57

Some descriptive tests were applied to find out the characteristics of the respondents such as gender, age, designation, qualification, experience and

the sector in which they are currently serving whether public or private. The results of the study are presented in Table 1.

Descriptive statistics for dependent variable and independent variables are presented in Table 2.

TABLE 2

Descriptive Statistics for Dependent Variable and Independent Variable

	Mean	Std. Deviation
Transformational Leadership	2.9951	0.55786
Idealized Attributes	2.9712	0.63522
Idealized Behaviours	3.0000	0.75165
Inspirational Motivation	3.1124	0.68289
Intellectual Stimulation	2.9092	0.55726
Individualized Consideration	2.9829	0.65882
Transactional leadership	3.1745	0.63465
Contingent Reward	3.2023	0.71550
Management_by_Exception (Active)	3.1466	0.68101
Laissez Faire	2.4613	1.10385
Management by Exception (Passive)	2.4326	0.95224
Passive/Avoidant	2.4469	0.97022
Motivation	4.1942	1.01525

Transformational leadership has positive and significant impact on Motivation ($r = 0.313$, $p < 0.01$). Idealized Attributes has positive and significant relationship with Motivation ($r = 0.356$, $p < 0.01$). Idealized Behaviours has positive, moderate and significant relationship with Motivation ($r = 246$, $p < 0.01$). Inspirational Motivation has also positive, moderate and significant relationship with Motivation ($r = 0.237$, $p < 0.01$). Intellectual Stimulation has also positive, moderate and significant relationship with Motivation ($r = 0.202$, $p < 0.01$). Individualized Consideration has positive, moderate and significant relationship with Motivation ($r = 0.286$, $p < 0.01$).

Correlations of transformational and its traits with independent variables are presented in Table 3.

TABLE 3

Correlation of Transformational and its Traits with Independent Variable

Motivation		
Transformational leadership	Pearson Correlation	0.313**
	Sig. (2-tailed)	0.000
Idealized Attributes	Pearson Correlation	0.356**
	Sig. (2-tailed)	0.000
Idealized Behaviours	Pearson Correlation	0.246**
	Sig. (2-tailed)	0.000
Inspirational Motivation	Pearson Correlation	0.237**
	Sig. (2-tailed)	0.000
Intellectual Stimulation	Pearson Correlation	0.202**
	Sig. (2-tailed)	0.001
Individualized Consideration	Pearson Correlation	0.286**
	Sig. (2-tailed)	0.000

Note: ** Correlation is significant at 0.01 level (2-tailed)

The present study shows that there is positive and significant association between Transformational Leadership and Motivation. The results of the study reveal that there is significant and positive relationship between Idealized Attributes and Motivation. The study indicates that there exists a positive and significant relationship between Idealized Behaviour and Motivation. Furthermore, there exists a positive and significant relationship between Inspirational Motivation and Motivation and there emerges a positive and significant association between Intellectual Stimulation and Motivation. There exists a positive and significant relationship between 'Individualized Consideration' and Motivation.

The results of the study show that there exists a positive and significant relationship between Transactional Leadership and Motivation and there is positive and significant relationship between 'Contingent Reward' and Motivation while a positive and significant relationship between Management by Exception (Active) and Motivation is also observed.

Correlation of transactional and its traits with independent variable are presented in Table 4.

TABLE 4

Correlation of Transactional and its Traits with Independent Variable

Motivation		
Transactional leadership	Pearson Correlation	0.362**
	Sig. (2-tailed)	0.000
Contingent Reward	Pearson Correlation	0.295**
	Sig. (2-tailed)	0.000
Management by Exception (Active)	Pearson Correlation	0.378**
	Sig. (2-tailed)	0.000

Note: ** Correlation is significant at 0.01 level (2-tailed)

Transactional Leadership has positive and significant relationship with Motivation ($r = 0.362$, $p < 0.01$)

Contingent Reward has also positive and significant relationship with Motivation ($r = 0.295$, $p < 0.01$)

Management by Exception has positive and significant relationship with Motivation ($r = 0.378$, $p < 0.01$)

The relationship between the components of transformational leadership styles (which include idealized attributes, idealized behaviour, individualized consideration, intellectual stimulation and inspirational motivation) and motivation of the employees of banking sector in Pakistan appears to be positive and significant.

Furthermore, the study reveals a positive and significant relationship between the components of transactional leadership styles (which include contingent reward and management by exception) and motivation of the employees of banking sector in Pakistan.

V. CONCLUSIONS

The present study tries to analyze the relationship between transformational and transactional leadership styles on the motivation of banking employees in Pakistan. The results of the study show that there is positive and

significant relationship between Transformational Leadership with the motivation. Therefore, employees are motivated with this style of leadership. However, the results of the study show that the impact of transactional leadership styles on the motivation of banking employees in Pakistan is more effective than the transformational style. The study concludes that there should be transactional leadership in the employees of banking sector. When the employees will be more motivated they will work hard and then organizational productivity will go up.

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