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Impact of Ownership and Concentration of Land on Schooling

Haroon Jamal and Amir Jahan Khan[*]

Abstract

The study argues for land reform in Pakistan by demonstrating an inverse relationship between students' enrollment and land concentration and landlessness for 50 districts of the Punjab and Sindh provinces. With the help of enrollment data from the Population Census, a composite measure is constructed and linked with the inequality in ownership of land and landlessness. While the effect of the development level of districts on schooling is as expected positive and substantial, both the Gini coefficient for land ownership and coefficient of landlessness are negative and statistically significant.

I. Introduction

Most of the economic reforms at poverty reduction are oriented either towards augmenting income and employment opportunities for the poor, moderating their cost of living, improving their human capital by access to basic services, or mitigating against the worst manifestations of poverty. These are all important elements of a comprehensive and integrated poverty reduction strategy. But the impact of many of these reforms takes time. Furthermore, there is no guarantee that improvements made will endure over the long term. One approach that is seldom emphasized and takes least priority, but that has the potential of achieving both results, is a change in the underlying distribution of assets, especially agricultural land, brought about either through reform or sequestration of such assets and their subsequent redistribution.

The evidence suggests that indeed the distribution of land within and across countries affected the nature of the transition from an agrarian to an industrial economy and has been significant in the emergence of

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[*] The authors are Principal Economist and Economist respectively at the Social Policy and Development Centre (SPDC), Karachi. The views expressed are those of the authors and do not necessarily reflect the policies and views of SPDC.

sustained differences in human capital, income levels and growth patterns across countries.

The adverse effect of the implementation of universal public education is magnified by the concentration of land ownership. Hence, as long as landowners have affected the political process and thereby the implementation of education reforms, inequality in the distribution of land ownership has been a hurdle for human capital accumulation, slowing the process of industrialization and the transition to modern growth. In societies in which agricultural land ownership was distributed rather equally, growth enhancing education policies were successfully implemented.

The process of development in Korea, for instance was marked by a major land reform followed by a massive increase in governmental expenditure on education. During the Japanese occupation in the period 1905-1945, land distribution in Korea became increasingly skewed and in 1945 nearly 70% of Korean farming households were simply tenants (Eckert, 1990). In 1949, the Republic of Korea instituted the Agricultural Land Reform Amendment Act that drastically affected landholdings. Land reforms and the subsequent increase in governmental investment in education were followed by stunning growth performance that permitted Korea to nearly triple its income relative to the United States in about twenty years, from 9% in 1965 to 25% in 1985.

North and South America also provide evidence for differences in the process of development, and possibly overtaking, due to the effects of the distribution of land ownership on education reforms within land-abundant economies. As argued by Engerman and Sokoloff (2000) the original colonies in North and South America had vast amounts of land per person and income levels comparable to the European ones. North and Latin America differed in the distribution of land and resources. The United States and Canada were deviant cases in their relatively egalitarian distribution of land. For the rest of the new world, land and resources were concentrated in the hands of a very few, and this concentration persisted over a long period. These differences in land distribution between North and Latin America were associated with significant differences in investment in human capital.

Goyal (1996) argues that in Himachal Pradesh (an Indian State), land reforms have paid dividends in terms of more children going to school. A high land person ratio and more equal distribution of land have distorted the feudal structure. People are better placed now in participating in school matters and sending their children to school.

Besides growth and human capital accumulation, the political economy aspects of land concentration and landlessness are also important. The land-owing elites enjoy enormous political power because of their monopoly over the votes of their tenants in elections. The nexus of relationships between the feudal class, the bureaucracy, and agencies of law and order also ensures that the rural rich enjoy privileged access to such inputs as irrigation and credit, while smaller farmers are marginalized in the process.

Research on poverty in Pakistan indicates that high rural poverty is due to the highly skewed distribution of land ownership in the country. Further, the incidence of poverty is high among the rural landless, and access to land takes a high proportion of households out of the poverty trap (SPDC, 2000). Lack of land ownership is, therefore, both a cause of poverty as well as a consequence of it. The state of poverty further causes households to drop their children from the schooling system. The out of school children assist their families in sustaining livelihoods in rural areas.

The purpose of this research is to demonstrate how 'landlordism' (land concentration and landlessness) impede education attainments and consequently, increase poverty and income inequality. The study is based on the latest data of the Agricultural Census (2000) for the main agrarian regions of Pakistan (Punjab and Sindh provinces). School Life Expectancy (SLE), which is a useful composite measure, is constructed on data for student enrollments which has been made available by the Population Census (1998).

The paper is organized as follows. The next section provides some stylized facts about land distribution in Pakistan. The details of the methodology for constructing SLE and other variables are furnished in section 3. The model is also specified in this section. The fourth section discusses the main regression results, while a conclusion is provided in the last section.

2. Land Ownership Pattern in Pakistan

According to the World Bank (2002) report, almost one-half of rural households in Pakistan own no land. The report further states that around 2 percent of households own more than 40 acres of land and control 44 percent of land area. Collectively, large and very large farmers control 66 percent of all agricultural land. These inequalities are reflected by the Gini coefficient of land concentration, which according to the report is 0.78 for rural Pakistan.

A schematic view of distribution of land ownership in the Punjab and Sindh provinces is portrayed in the following figures. One may easily grasp the extent of disparity in the distribution from the figures. About 56

percent of farm households (less than 5 acres) have command over only 16 percent of land in the Punjab province, while 5 percent of farmers (over 25 acres) enjoy ownership of 31 percent of total available land. In the Sindh province 46 percent farm households (less than 5 acres) own 13 percent of land while 3 percent (over 25 acres) occupies 26 percent farm area.

Figure-1: Distribution of Land Ownership – Punjab Province
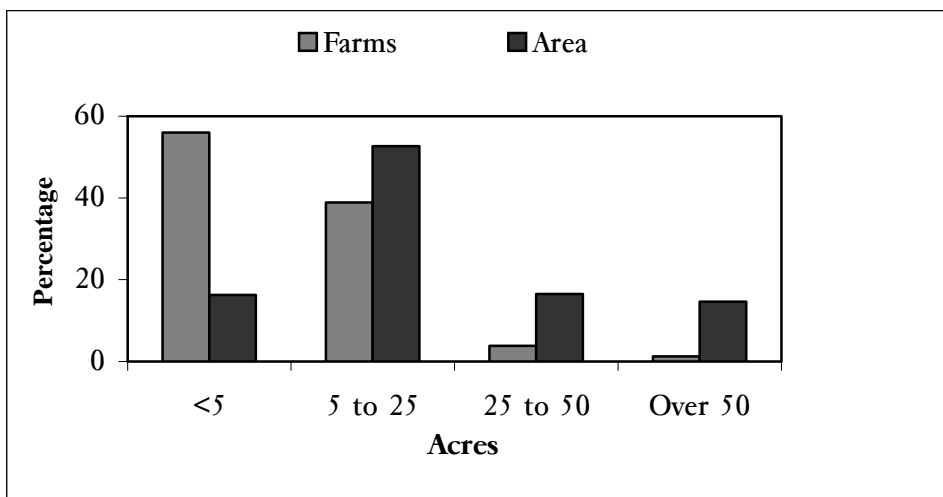
Figure-2: Distribution of Land Ownership – Sindh Province
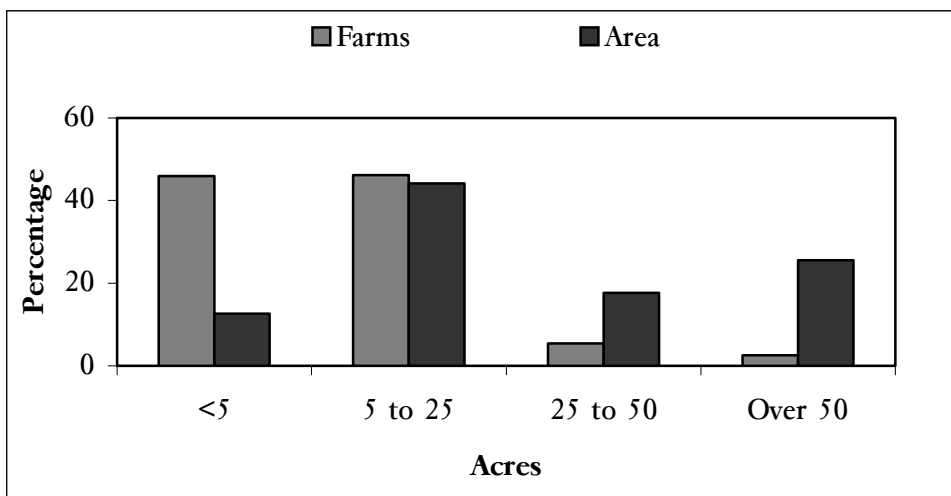
3. Variables, Data and the Model

A simple model of school enrollment is specified and level of district economic development (*IED*), land concentration (*Gini* of land ownership), proportion of tenant households (*T*) and proportion of households with no access to land (*Nl*) are treated as the key primary determinants of human capital formation through formal schooling. The specific equation is given below with μ, which is a standard stochastic term of the model.

$$SLE_i \equiv \alpha + \beta_1 (IED)_i + \beta_2 (Gini)_i + \beta_3 (T)_i + \beta_4 (Nl)_i + \beta_5 (SINDH)_i + \mu_i \quad \textbf{(1)}$$

The computational detail of School Life Expectancy (SLE), Index of Economic Development (IED) and Gini is provided in the following sub-sections.

3.1. School Life Expectancy (SLE)

According to the World Education Report (UNESCO, 1995), the SLE is defined as "the number of years of schooling which the child can expect to receive in the future, assuming that the probability of his or her being enrolled in school at any particular future age is equal to the current enrollment ratio for that age". Taking the reference age-range to be 5-24, SLE for the *ith* district may be expressed as:

$$SLE_i = \sum_{j=5}^{24} E_{ij}$$

where E_{ij} is the enrollment rate at age j in district i. Thus, SLE expresses in a compact form the enrollment position for the district over the 19-year schooling cycle. As Ram (1999) pointed out, the advantage of SLEs is that they are based on enrollment rates in the standard age-range for schooling, and the difficulty of combining enrollment rates for three conventional levels is avoided.

Student population in different age-cohorts is taken from the Population Census (1998). For this exercise, SLE is computed separately for rural males, rural females and combined rural enrollments.

2.2. Index of Economic Development (IED)

As the National Accounts do not report Gross Domestic Product at the district level, the district's economic development is represented by a composite development index. Various attributes or indicators have been

integrated to develop a composite Index of Economic Development. These indicators measure the economic potential and achieved levels of income and wealth; extent of mechanization and modernization of agriculture; housing quality and access to basic residential services; and the development of transport and communications. A brief description of individual indicators is given below.

Household income and wealth is the most discussed welfare attribute in the literature. Direct income data at provincial or district levels are not available; therefore various proxies are used to estimate the income and wealth position of a district. For the rural economy, *cash value of agricultural produce per rural person* and *livestock per rural capita* are used. All major and minor crops are considered to estimate the district's cash value from agriculture. This indicator is based on the aggregation of 43 crops, including fruits and vegetables. Different types of livestock have been aggregated by assigning weights as recommended by the FAO (Pasha and Hassan, 1982) to reflect the capital value of various animals and poultry. For the urban part of a district, *per capita value added in large-scale manufacturing* is used to proxy the level of urban income. Value added by the small-scale component could not be included due to the lack of data. On the assumption that there may be a direct link between the number of bank branches in a district and the volume of bank deposits, *number of bank branches per capita* is used as a crude measure of the district's wealth. *Per capita car ownership* is also used to proxy the district's income and wealth in the urban areas.

Modernization of agriculture is another area of development which has direct or indirect effects on the prosperity and standard of living of the rural population. To capture the process of mechanization in agriculture, *tractors per 1000 acres of cropped area* is used. *Consumption of fertilizer per 100 acres of cropped area* is also used as the indicator of modernization in agriculture. In addition, *irrigated area per 100 acres of cropped area* is used to capture the access to canal irrigation systems and tube-wells.

Shelter is one of the basic needs, and housing conditions are one of the key determinants of the quality of life. For IED, the *proportion of households using electricity, gas and inside piped water connections* is used. The quality of housing stock is represented by the *proportion of houses with cemented outer walls and RCC/RBC roofing. Rooms per persons* is used to proxy adequate housing in a district.

Three indicators have been included to portray the level of development of the transport and communication sector in a district. Roads and the transportation network have a significant impact on socialization

and modernization. Therefore, *metalled road mileage per 100 square miles of geographical area* of a district is included in the index. With regard to the availability of transport vehicles, a summary measure, viz., *passenger load carrying capacity* is included. Different vehicles are aggregated assigning weights as recommended in Pasha and Hassan (1982). *Number of telephone connections per 1000 persons* is also used to observe the distribution of this important indicator of the standard of living.

The index is constructed[1] along the lines proposed by Filmer and Pritchett (1999) through the use of the Principal Component Analysis (PCA) on the afore mentioned indicators. The PCA searches for the linear combinations of the variables selected that account for the maximum possible variance in the data. The exercise was undertaken on the full sample and principal components were used to rank districts according to their economic level of development[2].

3.2. Gini Index of Land Ownership (Gini)

The *Gini* coefficient compares the Lorenz curve of a ranked empirical distribution with the line of perfect equality. The line assumes that each element has the same contribution to the total summation of the variable under investigation. The *Gini* coefficient ranges between 0 and 1. Score of 0 indicates that there is no concentration of the variable in any single category (perfect equality), and score of 1 indicates that there is total concentration of the variable in a single category (perfect inequality).

Gini coefficients for this exercise are computed from the grouped data of Agricultural Census 2000, and hence the magnitudes of coefficients are lower as compared with the *Gini* computed from individual farm-level data. The standard formula for computing *Gini* for grouped data is furnished below.

$$Gini = \left| 1 - \sum_{i=1}^{N} \left(\sigma Y_{i-1} + \sigma Y_i \right) \left(\sigma X_{i-1} - \sigma X_i \right) \right|$$

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[1] Diverse sources are used to gather data for the above indicators. Major sources include; District Census Reports (1998), Provincial Census Reports (1998), Agriculture Statistics of Pakistan (1998-99), Provincial Development Statistics, Crop Area Production (1997-98), Census of Manufacturing Industries (1995-96). Further, to fill the missing gaps or for updating various information, unpublished data are obtained from the Provincial Bureaus of Statistics, State Bank of Pakistan and the Ministry of Agriculture.

[2] The results of the Principal Component Analysis (factor loading and communality) are provided in the Appendix, Table A.1.

where;

N   =   Number of Categories

σ =   Cumulative Distribution of Values

Y, X   =   Proportion of farms and land area owned respectively

4. Empirical Findings

The main objective of this research is to show empirically or to quantify the effect of land concentration and landlessness on the level of the district's enrollment. For this purpose, the afore mentioned model is estimated separately for rural combined enrollment, rural males and rural females. Table 1 gives a description of the variables used in the regression analysis, while ordinary least-square (OLS) estimates are provided in Table 2 through Table 4 for combined, male and female enrollments respectively.

Table-1: Description of Variables Used in Regression Analysis

	Median	Maximum	Minimum	Standard Deviation
Rural School Life Expectancy (Years)	5	10	2	2
Rural School Life Expectancy – Male	6	11	3	2
Rural School Life Expectancy – Female	3	9	1	3
Index of Economic Development (%)	28	100	1	21
Land Ownership Gini (%)	0.54	0.67	0.44	0.05
Tenant Households (%)	0.06	0.31	0.01	0.06
No Access to Land (%)	0.53	0.94	0.16	0.15

Note: Figures of schooling years are rounded.

On the average, as reflected by the median, 5 years of schooling is estimated for rural areas (Table 1). Male SLE is 6, while a lower attainment (3 years) is estimated for rural females. A maximum *Gini* coefficient[3] (67 percent) is computed for Muzaffargarh, which is a district of southern Punjab. On the other hand, the lowest magnitude of *Gini* is 44 percent, which is associated with Faisalabad (a district of middle Punjab).

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[3] These *Gini* coefficients, as mentioned above, are computed from grouped data with 10 categories. Therefore, the magnitude is underestimated as compared with one computed with individual farm-level data.

Nonetheless, Table 1 shows a median *Gini* of 54 and data also reveal that except for eight districts, all districts have Gini more than 50 percent. A maximum of 31 percent tenant households are reported in the Agriculture Census with a median of 6 percent. Households with no access to land (non-farm including livestock holders) have a median of 53 percent.

Before the analysis of the regression results of equation (1), the discussion warrants attention towards the simplistic nature of the specification relative to the complex process that generates the flow of human capital in the form of school enrolment (Ram, 1999). For instance, the role of relative prices and physical capital may be good candidates for inclusion in the equation to explain school enrollment. It was, however, not feasible to include these variables due to an absence of data. To econometrically evaluate the model specification, an important statistical test[4] (White, 1980) is applied. White's test for the joint null hypothesis of no-specification-error and homoskedasticity is not rejected at the 5 percent level for any regression (Table-2 through Table-4). Therefore, the model used appears econometrically reasonable and theoretically close to what is feasible.

Table-2: Regression Result [Rural Areas] Dependent Variable: School Life Expectancy

Variables	Coefficients	Std. Error	t-Statistic	Prob.
Index of Economic Development (%)	0.0583	0.0178	3.262	0.0021
Gini – Land Ownership (%)	-0.0879	0.0442	-1.983	0.0534
Tenant Households (%)	-0.1443	0.0367	-3.922	0.0003
No Access to Land (%)	-0.0886	0.0255	-3.471	0.0012
(Constant)	14.0467	2.7686	5.073	0.0000
R-squared	0.3906	Mean dependent var.		5.3755
Adjusted R-squared	0.3364	S.D. dependent var.		2.0963
S.E. of regression	1.7075	Akaike info. Criterion		4.0026
Sum squared residual	131.21	Schwarz criterion		4.1938
Log likelihood	-95.066	F-statistic		7.2124
Durbin-Watson statistics	1.5898	Prob. (F-statistic)		0.0001

Notes: All Coefficients are statistically significant at least at 5% level.

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[4] Basically it consists of taking the residuals from the model to be tested, and regressing the squares of these residuals on the (unduplicated) squares and cross-products of the model regressors. Then, under the null hypothesis, test statistic (nR^2) is distributed as a chi-square with degree of freedom equal to the number of regressors in the test regression.

**Table-3: Regression Result [Rural–Male] Dependent Variable:
School Life Expectancy**

Variables	Coefficients	Std. Error	t-Statistic	Prob.
Index of Economic Development (%)	0.0530	0.0180	2.9417	0.0051
Gini – Land Ownership (%)	-0.0584	0.0454	-1.2869	0.2047
Tenant Households (%)	-0.1399	0.0359	-3.8914	0.0003
No Access to Land (%)	-0.0869	0.0261	-3.3298	0.0017
(Constant)	13.637	2.7059	5.0397	0.0000
R-squared	0.3589	Mean dependent var.		6.5274
Adjusted R-squared	0.3019	S.D. dependent var.		2.0454
S.E. of regression	1.7089	Akaike info. Criterion		4.0043
Sum squared residual	131.428	Schwarz criterion		4.1955
Log likelihood	-95.108	F-statistic		6.2991
Durbin-Watson statistics	1.6496	Prob. (F-statistic)		0.0004

Notes: Except Gini, all coefficients are statistically significant at least at 1%
level.

**Table-4: Regression Result [Rural–Female] Dependent Variable:
School Life Expectancy**

Variables	Coefficients	Std. Error	t-Statistic	Prob.
Index of Economic Development (%)	0.0646	0.0185	3.4783	0.0011
Gini – Land Ownership (%)	-0.1197	0.0463	-2.5822	0.0131
Tenant Households (%)	-0.1504	0.0394	-3.8174	0.0004
No Access to Land (%)	-0.0923	0.0263	-3.5026	0.0011
(Constant)	14.577	3.0298	4.8114	0.0000
R-squared	0.4048	Mean dependent var.		4.1133
Adjusted R-squared	0.3519	S.D. dependent var.		2.2615
S.E. of regression	1.8205	Akaike info. Criterion		4.1308
Sum squared residual	149.152	Schwarz criterion		4.3220
Log likelihood	-98.2705	F-statistic		7.6525
Durbin-Watson statistics	1.54404	Prob. (F-statistic)		0.0000

Notes: Except Gini, all coefficients are statistically significant at least at 1%
level.

Table-2 contains OLS estimates of the SLE model for rural combined enrollment rates. A good explanatory power of the model specification is estimated. The most obvious characteristic of the estimates is the quantitatively sizable magnitude of *Gini*, tenant households and households with no access to land. All relations are negatives and coefficients are significant. District economic development, which is used here as a proxy for the district's GDP or income, is positive and also statistically significant. One may easily interpret from the specification that holding district development constant, a ten percent decrease in inequality of land ownership is associated with an increase of 1 year of schooling (on the average a decrease of *Gini* from 0.54 to 0.49 will have an increase from 6 to 7 years of schooling). Similar interpretations are also visible regarding tenant households and households with no access to land.

The gender disaggregation of SLE suggests significant improvement in female enrollment in the absence of landlordism or lesser land concentration. Highest R^2 and largest magnitudes associated with '*Gini*', 'tenant households' and 'no access to land' are evident in Table 4. Even the significant levels are much higher as compared with male or combined SLEs. Further, the effect of district development on female enrollment is also larger than male enrollment. Comparatively, regression results for male SLE (Table 3) are statistically weaker, although they do not refute the significant inverse relationship of land concentration and landlessness on school enrollment.

5. Concluding Remarks

Ownership of land, in situations where rural markets are incomplete and interlocked in character, can make a significant contribution to the food security and nutritional well-being of households, as well as to their ability to withstand shocks. The political economy implications of land reforms are also important. Land reforms could virtually herald a revolution in the countryside and would probably constitute the single most significant act of empowerment of the poor in Pakistan.

There is also the view that implementation of land reforms could impose significant costs in terms of foregone agricultural output. In other words, there is a positive relationship between farm size and productivity, and truncation of large farms will lead to a loss of output. The empirical evidence for this relationship however is, at best, ambiguous and it is hoped that efficiency losses due to land reforms are likely to be marginal.

This research considers the issue of land reform from another perspective. It links landlordism with school enrollment rates. Analysis has been carried out on data of Punjab and Sindh provinces, which are Pakistan's agricultural heartland. Following UNESCO (1995), a composite indicator of district's enrollment is computed with the age-wise enrollment data from the Population Census. This indicator, which measures the expected years of schooling in the 5-24 age group, is linked with the district's   level of development, *Gini* for landownership, proportion of tenant households and proportion of households with no access to land. The results are statistically sound, coefficients are significant and signs are according to *a priori* expectation. The effects of landlordism on female enrollment is more conspicuous than that of male.

- To conclude, land ownership concentration reduces human capital and increases income inequality, thus constraining growth rates. Therefore, educational policies and programs should take into consideration landlordism as an impediment to human capital formation through the formal schooling system.

Appendix

Table – A.1: Results of Principal Component Analysis
[Factor Loadings and Communality]

Indicators	Factors					Communality
	1	**2**	**3**	**4**	**5**	
Proportion of houses with RCC/RBC roofing	0.858	-0.109	0.116	-0.236	-0.130	0.834
Proportion of households using cooking gas	0.814	0.309	0.229	-0.102	-0.265	0.890
Telephone connections per 1000 persons	0.800	0.051	-0.026	-0.138	0.045	0.664
Bank Braches Per Capita	0.773	0.107	-0.143	0.019	0.204	0.672
Households with inside piped water connections	0.760	0.218	0.065	0.073	-0.239	0.692
Proportion of households using electricity	0.733	-0.235	0.251	0.194	0.239	0.750
Proportion of houses with cemented outer walls	0.696	-0.424	-0.063	-0.223	0.051	0.720
Metalled road mileage	0.571	-0.434	0.409	0.067	0.208	0.729
CAR Ownership Per Capita	0.386	0.528	-0.228	0.151	0.474	0.727
Passenger load carrying capacity	0.461	0.511	-0.332	0.331	-0.026	0.694
Fertilizer Consumption	0.355	0.459	-0.032	0.454	-0.419	0.720
Large Scale Manufacturing Value Added	0.278	-0.335	-0.332	-0.079	-0.142	0.326
Irrigated area per 100 acres of cropped area	-0.315	0.390	0.657	-0.004	-0.215	0.730
Tractors Per 1000 Acres of Cropped Area	0.298	0.403	0.315	-0.554	0.112	0.669
Rooms per persons	0.014	-0.419	0.453	0.497	-0.151	0.651
Livestock Per Capita	-0.391	0.353	0.075	-0.404	-0.143	0.467
Cash Value of Agricultural Produce	-0.268	0.352	0.362	0.192	0.563	0.680

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Industrial Clusters in Developing Countries:
A Survey of the Literature

Theresa Thompson Chaudhry[*]

Abstract

This paper provides a survey of the theoretical and empirical literature relating to industrial clusters. These clusters are groups of firms that are specialized by sector, located in close geographic proximity and consist of mostly small and medium sized enterprises. The benefits to firms from clustering are sometimes referred to as active and passive collective efficiency. Passive collective efficiency refers to benefits accruing to a firm by virtue of being in a cluster, such as access to markets and skilled labor, technological spillovers, flexible specialization, and reduced transaction costs. Active collective efficiency, on the other hand, stems from purposeful cooperation between clustered firms to undertake a large-scale project to upgrade production, such as entering into product marketing.

I. Introduction

An industrial cluster is a group of firms that are specialized by sector, located in close geographic proximity and consists of mostly small and medium sized enterprises. In recent years, clusters of small firms have been viewed optimistically as a source of growth in developing countries. Despite the small size of many of the firms, these clusters make sizeable contributions to developing countries' economies in terms of employment, output, and exports. Therefore clustering is an important aspect of the economies of developing countries.

In the past, there has been some doubt whether small firms could be a potential source of growth in developing countries. A leading undergraduate development textbook is only guardedly optimistic about the potential of small firms in developing countries:

> Small scale industry does indeed serve as a breeding ground for potential entrepreneurs...Some firms have the potential to grow to

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[*] Associate Professor, Dept of Economics, Lahore School of Economics, Lahore.

medium or even large enterprises. It is important, however, not to yield to romanticism. Statistically, very few small firms even survive over long periods of time, let alone grow up to be medium or large enterprises.[1]

While this statement does not preclude the growth of small firms in developing countries, the authors do not seem very confident about their potential. The same textbook cites a positive correlation between GNP per capita and the average size of industrial plants.[2] This statement seems to imply that there is not much place for small firms in a more developed economy. It overlooks the possibility that new types of industrial organization, such as clustering of small firms, can exist in a modern, industrialized economy. While small firms may suffer certain disadvantages, clustering may mitigate some of these difficulties. For instance, the Sinos Valley, Brazil footwear cluster has at least 75 large manufacturers (each with more than 500 employees) that grew from being small firms over the last 25 years.[3] Clustering is an aspect of small firm dynamics in developing countries that has not received sufficient attention.

The available evidence demonstrates that clusters of firms make sizeable contributions to developing countries' economies despite the small size of many or most of the individual firms (see Table-1 for more details). This paper focuses on the theorized benefits of clustering that have been discussed in the case study literature on developing country clusters, and emerging empirical analysis in this area.

Organization of Paper

Sections 2 and 3 of this paper define industrial clusters and summarize some of their common characteristics as described in the case study literature. Section 4 discusses the theorized benefits of clustering, referred to as active and passive collective efficiency. Section 5 presents some of the economic literature related to the study of clusters, and Section 6 presents the conclusions of the paper.

2. Defining Clusters

The major characteristics of the industrial model, as clusters are sometimes called, are described in Rabellotti (1995) as:

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[1] Gillis, Perkins, Roemer, Snodgrass (1996), p 498.
[2] Ibid, p 496.
[3] Schmitz (1995), p 13.

- Geographically grouped small and medium sized firms which are specialized by sector;

- Forward and backward linkages based on market and non-market exchanges of goods, information, and people;

- Common cultural and social background linking economic agents and creating a behavioral code, sometimes explicit but often implicit;

- Network of public and private local institutions supporting the economic agents acting within the cluster;

For purposes of this paper, a cluster will be defined as a group of firms located in the same geographic area, such as an industrial district, town, or small region, where there are a significant number of firms specialized in producing inputs for and manufacturing the same type of good. For example, a cluster in Sialkot, Pakistan specializes in surgical goods instruments, while clusters in Sinos Valley (Brazil), Agra (India), and Guadalajara and Leon (Mexico) all produce footwear. Some of the other clusters that have been studied specialize in the production of textiles and leather goods. Within a mature cluster, there are some vertically integrated enterprises, but for the most part, production does not generally take place within one firm. Various separate firms carry out the production process, which includes input production, manufacturing, and complementary services. Many clusters, especially the mature ones, have local business associations as well.

3. Characteristics of Clusters

Clusters are Widespread in Developing Countries

There are a growing number of case studies detailing the characteristics and growth paths of clusters in developing countries. These case studies provide one with a wealth of information about the functioning of clusters, but more fundamentally they demonstrate the prevalence of clusters across sectors and countries. Among the clusters that have been studied include surgical instruments in Sialkot, Pakistan, footwear in Sinos Valley, Brazil, cotton knitwear in Tiruppur, India, woolen knitwear in Ludhiana, India, shoes in Guadalajara and Leon, Mexico, footwear in Agra, India, clothing in Gamarra, Peru, textiles,

ceramic tiles, and metal engineering in Santa Catarina, Brazil, tanneries in Palar Valley, India, and blue jeans in Torreon, Mexico.[4]

Economic Importance of Clusters

Clusters produce a significant amount of output, with a great deal of this output bound for the export market. A few key figures give an indication of the economic importance of clusters in developing countries (more information is provided in Table 1). Pakistan's Sialkot cluster exported $125 million worth of surgical instruments in 1995-96.[5] Brazil exported 200 million pairs of shoes in 1993, most of which came from the Sinos Valley footwear cluster.[6] In Mexico, the two clusters of Guadalajara and Leon comprised 2900 of the 4500 shoe enterprises in Mexico in 1991.[7] The cluster in Guadalajara alone accounted for 27 percent of the 172.4 million pairs produced in Mexico in 1994.[8] In Tiruppur, India, there were at least 2000 clustered cotton knitwear firms in 1995, and they produced about 70 percent of India's exports of this commodity.[9] In Ludhiana, India, there were 10,000 firms and 200,000 workers producing Rs 241 billion[10] (almost $10 billion in U.S. 1991 dollars) of woolen knitwear in 1991. The Ludhiana cluster contained four-fifths of all woolen knitwear firms in India, producing 90 percent of the country's output of woolen and acrylic knitwear (and 95 percent of the country's exports of this product).[11] In Agra, India, 5000 clustered firms were producing 300,000 pairs of shoes per day in 1991-92.[12] Forty-five percent of India's leather is produced in Palar Valley, where there

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[4] Two issues of the journal *World Development* [Vol. 23, No. 1 (1995) and Vol. 27, No. 9 (1999)] were dedicated to the study of clusters in developing countries and each contain a number of case studies. For the Sinos Valley, Brazil, see Schmitz (1995) and (1999); for cotton knitwear in Tiruppur, India, see Cawthorne (1995); for woolen knitwear in Ludhiana, India, see Tewari (1999); for garments in Eastlands, Kenya, metal products in Kamukunji, Kenya, vehicle repair in Ziwani, Kenya, fish in Lake Victoria, vehicle repair and metal work in Suame, Ghana, clothing in Western Cape, South Africa, see McCormick (1999); for shoes in Guadalajara and Leon, Mexico, see Rabelloti (1995) and (1999); for footwear in Agra, India, see Knorringa (1999); for clothing in Gamarra, Peru, see Visser (1999); for textiles, ceramic tiles, and metal engineering in Santa Catarina, Brazil, see Meyer-Stamer (1998), for tanneries in Palar Valley, India, see Kennedy (1999); for blue jeans in Torreon, Mexico, see Bair and Gereffi (2001); and for surgical instruments in Sialkot, Pakistan, see Nadvi (1999).
[5] Nadvi (1999), p 1611.
[6] Schmitz (1998), p 12.
[7] Rabellotti (1995), p 33.
[8] Rabellotti (1999), p 1574.
[9] Banerjee and Munshi (2000), p 1, 17.
[10] Tewari (1999), p 1653.
[11] Tewari (1999), p 1652.
[12] Knorringa (1999), p 1590.

are at least 600 tanneries in five clusters. Table-1 summarizes some of the information regarding the economic significance of the individual clusters.

Table-1: Economic Significance of Clusters

Cluster	Exports	Production	Employment
Sialkot, Pakistan (Surgical Instruments)	$125 million of exports in 1995-1996	Most of production exported	300 manufacturers, 2,500 firms total related to surgical instrument industry
Ludhiana, India (Woolen Knitwear)	$121 million in exports in 1996-97	Produced 90% of India's woolen and acrylic knitwear	10,000 firms, 200,000 workers
Tiruppur, India (Cotton Knitwear)	70% of India's cotton knitwear exports	2.5 billion Rupees turnover in 1985	2000 firms in 1995
Agra, India (Footwear)	n.a.	300,000 pairs of shoes per day in 1991-92	5,000 firms and 60,000 employees
Palar Valley, India (Leather Tanning)	Expected exports in 2000-2001 are 80 billion Rupees	n.a.	600 firms
Sinos Valley, Brazil (Footwear)	$1.5 Billion in exports in 1997 (current prices) from Brazil, most from Sinos Valley, in 1990, Brazil accounted for 12.3% of *world* leather shoe exports; Sinos Valley exported 70% of output in 1991.	Approximately 142 million pairs of shoes produced in 1991	391 firms and 83,800 workers in 1996 in footwear; 1673 firms and 170,500 workers in cluster (footwear and related industries)

Guadalajara, Mexico (Footwear)	n.a.	Accounted for 27% of the 172.4 million (or about 46.5 million) pairs of shoes produced in Mexico	In 1990, 23% of footwear employment in Mexico in the state of Jalisco, mostly in the city of Guadalajara. In 1993, there were 1,100 firms and 25,000 employees in Guadalajara alone.
Leon, Mexico (Footwear)	n.a.	n.a.	In 1990, 50% of footwear employment in Mexico was in the state of Guanajuato, mostly in the city of Leon
Gamarra (Lima), Peru (Clothing)	n.a.	In 1993, estimated turnover was $800 million	In 1993, number of firms estimated between 6800 and 8000

Non-Vertically Integrated Production

Various separate firms in the cluster carry out the production process in stages, which includes input production, manufacturing, and complementary services. In general, production of a final good is not carried out in a single, vertically integrated firm. For example, in Sialkot (Pakistan), in addition to the cluster's core producers, there were various process specialized subcontractors and suppliers of locally manufactured scrap steel.[13] In the Sinos Valley (Brazil) shoe production takes place in stages that are often carried out in different firms, although some firms were vertically integrated.[14] In the Sinos Valley, there are suppliers that produce a variety of goods and services including raw materials, components, machinery, and services such as freelance design and transport. There also was an extensive use of subcontracting in the Sinos Valley, usually to small firms. In the Agra (India) footwear cluster, there are many input suppliers that produce different components, such as lasts, tools, leather board, soles, laces, stiffeners, and chemicals.[15] Manufacturers in the footwear clusters of Guadalajara and Leon (Mexico) buy their leather and soles from supplier firms.[16]

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[13] Nadvi (1999), p 1610.
[14] Schmitz (1999), p 17.
[15] Knorriga (1999), p 1590.
[16] Rabellotti (1999), p 1575.

Exports are Vital to Clusters

Clusters often export a great deal of their output. Pakistan's Sialkot surgical instrument cluster exports virtually all of its output to North America and Europe. The Indian clusters of Agra and Ludhiana used to export a large proportion of their output to the USSR. Exports to the Soviet Union were arranged through government-to-government contracts, and 50 percent of output from the Ludhiana cluster went there. This export channel collapsed along with the Soviet regime, but the clusters recovered quickly by finding new export markets in Europe and North America. In Ludhiana, exports grew from $32 million in 1991/1992 to $121 million in 1996/1997. For other data pertaining to cluster exports, refer to Table-1.

Common Cultural Background

In many clusters, there is a common cultural and social background linking economic agents and creating a behavioral code, sometimes explicit but often implicit. This may help to reduce transaction costs and increase the likelihood of cooperation and transfer of knowledge. The case studies of the Mexican footwear clusters in Guadalajara and Leon found that technological cooperation was most likely to occur among firms that were linked by family ties. These firms would trade technological information and exchange machinery. Informal relationships among the firms in Guadalajara and Leon led to subcontracting orders when there was excess demand, so that firms jointly sold products and recovered credits.[17] Informal contacts were also deemed important in the Brazilian cluster, as information was diffused among friends, family, neighborhood, and church.[18] A common cultural background and long history also characterize the Palar Valley (India) leather tanning cluster. It has been in existence since the 19th century, and is dominated by the local Muslim community.[19]

Business Associations

Many clusters (especially the mature ones) have local business associations. Sialkot (Pakistan) has three support institutions, the Metal Industries Development Centre, the Sialkot Dry Port Trust, and the Surgical Instrument Manufacturer's Association (SIMA). The local trade associations in Guadalajara and in Leon, Mexico (both called Camara del Calzado) promoted the local trade fair, organized the participation of cluster firms in international exhibitions, and sponsored market studies. These business

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[17] Rabellotti (1995)

[18] Ibid, p 12.

[19] Kennedy (1999).

associations are important because they have a role in assisting the cluster firms to cooperate in matters of common interest.

Nature of Relationships in International Markets

For the most part, the design, marketing, and retailing of goods such as those produced by clusters have taken place (and remained) in the developed countries. Cluster firms' goods are sold through various channels, including domestic agents, wholesalers, and foreign agents.[20] In the case of Torreon (Mexico), a textiles cluster that has experienced a significant expansion since the introduction of NAFTA, cluster firms have taken over all parts of the production process *except* design and product development, marketing, and retailing. It is believed that the U.S. "lead firms" view these activities as their core competencies, that there are significant barriers to entry, and that these are the highest value-added activities of the production process.[21] The small cotton knitwear firms in Tiruppur, India sold their goods to agents. These agents gave the small producers access to larger markets than would be otherwise accessible to them, but at the same time blocked the small firms from having direct access to markets as well as exercising control over prices.[22]

Many of the clusters have ties to large firms in developed countries. Some German international surgical instrument manufacturers subcontract work to the Sialkot cluster firms.[23] After trade liberalization and the loss of the guaranteed Soviet market, many foreign buyers from U.S. and European retail firms came to Ludhiana (India) to purchase wool knitwear.[24] The footwear exports of Guadalajara have also been dominated by U.S. agents.[25]

Shocks to Cluster Exports

In recent years, many clusters have experienced export shocks. Pakistan's Sialkot surgical instrument cluster faced a crisis situation in 1994 when the United States' FDA (Food and Drug Administration) restricted imports of surgical instruments from Pakistan because they did not meet quality assurance standards (including ISO 9000 certification). These quality assurance standards are intended to ensure the implementation of standardized and accountable quality control processes at each stage of the production

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[20] Cawthorne (1995), p 50.
[21] Bair and Gereffi (2001), p 1895.
[22] Cawthorne (1995), p 50.
[23] Nadvi (1999), p 1609.
[24] Tewari (1999), p 1654.
[25] Rabellotti (1999), p 1578.

process, including design, development, manufacturing, and distribution.[26] In the late 1980s, trade liberalization in Mexico had a dramatic impact on the footwear industry. Imports increased from 200,000 pairs of shoes in 1987 to 107 million pairs in 1991, and domestic production (in all of Mexico) fell from 245.2 to 199.6 million pairs of shoes.[27] The Indian clusters at Tiruppur and Ludhiana had to deal with liberalization of the trade regime beginning in 1991. Average tariffs fell from 142 percent to 40 percent on knitwear within a few years. Trade liberalization also affected Agra's footwear industry. Agra and Ludhiana had an additional challenge in the early 1990s when they lost a large segment of their market consisting of exports to the USSR. Since the late 1980s, the Sinos Valley footwear cluster in Brazil has had to deal with changes in the external environment that have involved great challenges for the cluster. One of these challenges has been increased global competition from China for U.S. buyers. In ten years, U.S. footwear imports from China grew 17 times their 1987 levels.[28] At around the same time, U.S. retailers began to place smaller orders to the Sinos Valley firms so that they could maintain smaller inventories. In addition, high inflation in Brazil followed by a currency anchor to the U.S. dollar led to a fall in exporters' receipts.[29]

Cooperation in Clusters

Cooperation is also an important characteristic of firm clusters. To illustrate, in 1994 when the U.S. FDA restricted imports from Pakistan, SIMA, the local business association in Sialkot, Pakistan, acquired the services of a U.S. quality assurance consultancy (with the financial assistance of the government) to give other cluster firms the training necessary for obtaining quality assurance certification. By the end of 1997, 208 firms were certified as complying with the quality assurance standards, and 153 more firms were either undergoing training or awaiting certification from the FDA.[30] A major attempt at horizontal cooperation was attempted, but failed in the Sinos Valley, Brazil cluster. An initiative called the "Shoes from Brazil Programme" was implemented to take action on marketing abroad and in Brazil, reorganize production at the firm level, and improve relationships within the supply chain.[31] In the Palar Valley, India, two-thirds of the leather tanneries were operating within four years after the Supreme Court issued its order to halt production due to pollution; 80 percent of the tanneries cooperated to build and operate common effluent (pollution) treatment plants. In Guadalajara,

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[26] Nadvi (1999), p 1606.
[27] Rabellotti (1999), p 1571.
[28] Schmitz (1998), p 11.
[29] Schmitz (1998), p 11.
[30] Nadvi (1999), p 1610.
[31] Schmitz (1998), p 31.

Mexico, the local trade association successfully lobbied the Mexican government for a temporary increase in tariffs when rapid trade liberalization took its toll on the cluster's sales.[32] Also in Guadalajara there is a group of exporting firms that exchanges technical information, machinery, and technicians, and discusses availability of inputs.[33]

4. Benefits of Clustering: Passive and Active Collective Efficiency

The notion that small firms could benefit from clustering is not a new idea. Alfred Marshall recognized that the grouping together of firms involved in related activities resulted in positive externalities.[34] These positive externalities include various perceived benefits from clustering, sometimes referred to as active and passive collective efficiency. Passive collective efficiency refers to benefits accruing to a firm by virtue of being in a cluster.

Each case study article about clusters presents a slightly different list, but the "passive" benefits of clustering can be summarized as follows. Firms in clusters often benefit from *market access,* referring to the fact that clusters often attract the attention of buyers, which improves the chances for firms to sell their products. As a result of the large number of firms operating in the same geographical area, firms have access to a large *pool of (usually skilled) labor. Technological spillovers* may occur because technical information can be easily diffused among producers. Specialization and division of the production process by phases leads to *flexibility* that allows firms to take advantage of different economies of scale afforded at different stages of production. This flexible specialization also leads to higher social welfare when firms face idiosyncratic demand uncertainty, as described by Kranton and Minehart (2000). There is also potential for *reduced transaction costs* within the cluster due to the availability of alternate suppliers, repeated interactions between firms, and ease of conveying information on those who renege on contract obligations. Other perceived benefits of clustering are that it helps firms to grow in "riskable steps."[35] Since clusters consist of manufacturers as well as suppliers dedicated to the production of specialized inputs, a firm starting up within the cluster can start small and focus on a particular stage of the production process or produce a single specialized input for other firms.[36] This significantly reduces start-up costs and lowers barriers to entry from credit constraints.

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[32] Rabellotti (1999), p 1579.
[33] Rabellotti (1999) p 1579.
[34] As quoted in Schmitz and Nadvi (1999), p 1504.
[35] Schmitz and Nadvi, p 1503.
[36] Ibid, p 1505.

Active collective efficiency, on the other hand, stems from purposeful cooperation between the firms of the cluster and can be further divided into the sub-categories of horizontal cooperation (also called joint action) and vertical cooperation.[37] Many clusters have business associations whose role it is to support the cluster, and these associations may have a role in fostering cooperation within the cluster. Due to the shocks to exports faced by many of the clusters, there has been a need for upgrading within the clusters.[38] There are three major ways that individual firms or clusters may upgrade, and the firms' capacity to upgrade is often dependent on their ability to cooperate or engage in active collective efficiency.

First, firms may engage in *process upgrading*, which consists of reducing costs either by re-organizing production or by implementing new technology. The second type of upgrading is referred to as *functional upgrading*, leading to a greater involvement of manufacturers in the design and marketing process. The last category of upgrading, *product upgrading*, entails producing more sophisticated (higher value-added) goods.

The first type of upgrading, process upgrading, can involve a transformation of firms' relationships with their suppliers, which can also be described as "vertical cooperation." Upgrading may take the form of introducing new production technologies (such as new machines) or may be a reorganization of production relationships using the same production technology. Whatever forms the upgrading takes, the desired result is generally higher and more reliable quality and shorter delivery times in the processing of orders which often come from foreign buyers.

> The second and third type of upgrading may necessitate joint action or "horizontal cooperation" between the firms of the cluster. This is especially true in the case of clusters because most of the firms are too small to make the necessary investments to carry out the activities of product development, marketing, and retailing individually. One must also consider the fact that international buyers are already established members of the market structure. Joint action by the cluster to break into the activities traditionally carried out by foreign buyers is likely to be opposed.

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[37] Ibid, p 1504-5.
[38] Ibid, p 1507.

5. Literature Review

Case Studies and Other Literature on Active Collective Efficiency and Cooperation among Clustered Firms

The majority of the case studies on industrial districts or clusters stress the need for joint action to overcome the new commercial pressures that many of the clusters have faced due to trade liberalization (Mexico, India), quality or environmental standards (Pakistan, Palar Valley India), increased global competition (Brazil), or loss of traditional markets (India).[39]

In Sialkot, Pakistan[40] a cluster of firms consisting of approximately 220 producers and 1500 subcontractors produces surgical instruments mainly for foreign markets in the United States and Western Europe. The cluster exported $124 million worth of goods in 2000-2001.[41] Since doctors and hospitals in the U.S. often purchase disposable surgical instruments as "kits," or packages of surgical instruments that are sterilized and specialized for use in particular medical procedures, a new joint action initiative has been proposed including a plan for these kits to be produced locally and sold directly to hospitals, rather than through a third party.

In a case study of woolen knitwear in Ludhiana, Tewari attributed the recovery of the cluster (after the collapse of the Soviet market) to the cluster's strong presence in the domestic market. The large and medium sized firms created brands of their own (in other words, product upgrading) for the domestic market that were of higher quality than those exported to the Soviet Union. This attention to design and quality for the up-scale domestic market made for an easier transition to exporting to the developed nations. In addition, production for the Indian domestic market functioned as an insurance mechanism for firms attempting to enter new export markets. Therefore, according to Tewari's interpretation, the domestic market can play an important role as both a learning opportunity as well as an assured market for its goods (at least until trade liberalization progresses further).

Rabellotti (1995, 1999) examined clusters of shoe producers in Mexico. The first study (1995) compared shoe clusters in Guadalajara and Leon to clustered shoe producers in Italy. This paper found backward linkages (in other words, relationships between manufacturers and their suppliers) to be stronger in Italy than in Mexico, but found that forward linkages (into marketing and commercialization) were weak in both Mexico and Italy. Her case study also determined that informal relationships took on a greater significance in the

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[39] Schmitz and Nadvi (1999).
[40] Nadvi (1999).
[41] SMEDA (2001), p 13.

Mexican clusters than in the clusters in Italy. Rabelloti's second study (1999) focused on the Guadalajara cluster and how inter-firm relationships were affected by trade liberalization. This study found (using subjective survey instruments) that firm performance was positively correlated with vertical and horizontal cooperation. In addition, approximately half of the firms cooperated with their suppliers in matters such as information exchange, negotiation of payment and delivery conditions, joint product development, quality improvement, and delivery time.[42] On the other hand, there was evidence that vertical cooperation was still lacking in many respects, despite the pressures of increased competition in international markets. For example, the survey found that manufacturers continued to have delivery problems with suppliers.

Schmitz (1995, 1999) investigated issues of cooperation in the Brazilian footwear cluster of the Sinos Valley. The first case study documented the history and growth of the cluster from the 1960s to the 1990s. During this period, the cluster grew from a protected infant industry producing for the domestic market into a powerhouse exporter with a substantial share of the world market for shoes.[43] Export agents, especially from the United States, played a large role in the development of the cluster as a major exporter. Cooperation among the firms has ebbed and flowed over the last thirty years. Prior to the 1970s, trust and cooperation founded in a common social identity (German emigrant heritage) was strong. During the 70s and 80s, this cooperation waned as the cluster experienced rapid growth, but then re-emerged in the 1990s. The second study (1999) explored the recent initiatives for cooperation in the Sinos Valley in more detail. Greater cooperation between manufacturers and intermediate input producers improved the quality of goods and decreased delivery times and batch sizes of the footwear in response to the demands of foreign buyers in the U.S. Since the late 1980s however, the cluster has been faced with increased competition from China for U.S. buyers. The "Shoes from Brazil Program," a major joint action initiative to improve marketing abroad, failed because the largest five exporting firms (that were vertically integrated and had a close relationship with the largest U.S. buyer) opposed the plan and undermined it by exerting their influence in the shoe manufacturers' association, Abicalcados.[44]

A related area of research is the study of Global Commodity Chains. Global Commodity Chain (GCC) or global value chain analysis[45] takes into

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[42] Rabellotti, (1999) p 1575.

[43] Brazil's exports claimed over 12 percent of the world footwear market, and the Sinos Valley produced the majority of these exports.

[44] Schmitz (1998), p 34.

[45] Gereffi uses the term "Global Commodity Chain" while Humphrey and Schmitz use the term "global value chain".

account the fact that the design, production, and marketing of products is a chain of activities that do not necessarily occur within the same firm.[46] While this definition refers to a general phenomenon, GCC and global value chain analysis have also been applied to the relationships between clusters and foreign buyers. In some cases, such as the ones examined here, the value chain extends across national borders. Developing country clusters are often part of "buyer-driven commodity chains," as defined by Gereffi. According to him:

> Buyer-driven commodity chains refer to those industries in which large retailers, marketers, and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries, typically located in the third world. This pattern of trade-led industrialization has become common in labor-intensive, consumer goods industries such as garments, footwear, toys, housewares, consumer electronics and a variety of handicrafts. Production is generally carried out by tiered networks of third world contractors that make finished goods for foreign buyers. The specifications are supplied by the large retailers or marketers that order the goods...these companies design and/or market – but do not make – the branded products they order. They are part of a new breed of 'manufacturers without factories' that separate the physical production of goods from the design and marketing stages of the production process.[47]

The implication in the previous quote is that developed country firms "govern" or basically exercise control over the global commodity chain, even in the absence of ownership of the stage firms. The question then arises: Do the buyers (usually from developed countries) control the value chain to an extent that inhibits upgrading of the cluster into the services of marketing and retailing? Some of the authors who have written about industrial clusters in developing countries have expressed concern that the clustered firms producing goods for large multinational firms will become trapped in a subordinate role of low value added production while the multinationals that produce the designs and do the marketing and retailing will take the majority of the profits.

However, since the firms being studied here are geographically clustered, specialized in the same sector, and often have their own business

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[46] The literature on cluster case studies and the literature on value chain analysis have evolved somewhat differently. According to Humphrey and Schmitz (2000), the cluster case studies have focused on interactions within the cluster, such as local level governance and cooperation, while value chain analysis emphasizes links with the outside world and pays less attention to the role of local cooperation between firms.
[47] Gereffi (1999), p 4.

associations, the possibility arises that clustered firms may be able to cooperate in order to break away from the foreign buyers and produce their own designs or do their own marketing in order to gain a greater share of producer surplus.[48,] As was discussed above, the industrial clusters in the Sinos Valley (Brazil) and Sialkot (Pakistan) have both attempted joint action initiatives, with mixed results.

Thompson (2005a) developed a theoretical model to examine the conditions under which clustered firms in a less developed country may cooperate in a "joint action" to market their output in a developed country. The joint action eliminates the role of an intermediary firm in the developed country. The clustered firms are heterogeneous in expected quality of output. The clustered firms know the quality type of other firms, but the foreign intermediary does not. The intermediary, however, has a lower marketing cost than the clustered firms. The main result of the model is that joint action can occur among high quality type firms. The low quality firms on the other hand always use the foreign intermediary to distribute their output. The model also shows that joint action is more likely to take place when the size of the cluster, the probability of producing high quality by the high quality firms, and the final market price of the good are high, and when the marketing cost is low.

Thompson (2005b) empirically examined the firm-level characteristics that determine the clustered firms' interest in intra-cluster cooperation to market their own goods, using data collected from the surgical instrument cluster in Sialkot (Pakistan). The results demonstrated that firms were more likely to be interested in such initiatives once they already had some direct experience in marketing and when firms had a lower opportunity cost of leaving their current customers, where opportunity cost was measured by the length of the trading relationship.

Literature on Transaction Costs, Relational Contracting and Passive Collective Efficiency

Weak contract enforcement institutions characterize many of the developing countries where industrial clusters are found. In environments where an effective legal system or formal system of contract enforcement is lacking, individuals and firms rely on informal means to enforce agreements, also referred to as relational contracting.[49] The three major methods for

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[48] See Humphrey and Schmitz (2000), Kaplinsky (2000), Schmitz (1999).

[49] Relational contracting or informal enforcement may not necessarily be a substitute for the judicial system; in fact they might be complements.

informal contract enforcement include: i) dealing only with trusted parties such as friends and family members, ii) contracting repeatedly with the same parties (so that the value of the relationship prevents cheating), and iii) community enforcement (where the threat of sanction by a third party ensures that an agreement is upheld).[50] Depending on the characteristics of a particular geographic area or grouping of agents, one of these methods may be more effective than the others in supporting contract enforcement. For example, since clustered firms all produce similar goods and are geographically concentrated, community enforcement might be a stronger force than bilateral relationships. If community enforcement is not present, the threat of sanction by an individual supplier in the cluster would most likely be ineffective since there are many other similar suppliers.

Banerjee and Munshi (2000) presented a theoretical model and empirical testing of social network-based lending, comparing the investment and earnings profiles of migrants and established producers in the Tiruppur knitwear cluster. They found that the established producers belonging to the Gounders caste, with access to cheaper informal credit through a social lending network, had lower output growth but invested more at all levels of experience as compared to the migrants. The migrants, with less access to informal credit networks, invested less even though they have higher ability.

Ilias (2001) focused on the role of family labor in the Sialkot surgical instrument cluster and the distortionary effects of the decision to use family versus non-family labor. He concluded that there existed a labor market distortion such that family managers were preferred to non-family and therefore firm output was correlated with family size.

Woodruff (1998) studied clustered firms in the Mexican footwear industry. His study summarized the results of surveys conducted in Guadalajara and Leon and provided a qualitative analysis of the effect of trade liberalization on contract enforcement in the two clusters. He found that prior to trade liberalization, manufacturers relied on reputation mechanisms rather than the courts to enforce agreements with retailers. Once trade liberalization was underway, manufacturers were powerless to use sanctions to enforce contracts with retailers because the retailers had access to alternate supplies through the world market. Retailers cancelled orders, causing some of the cluster firms to go bankrupt since there was no longer a need for the retailers to maintain a good reputation in the cluster. In this way, trade liberalization weakened relational contracting.

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[50] Community enforcement requires that information about cheaters is known throughout the community, and that members of the community refuse to trade with known cheaters.

Thompson (2005b) tested an idea from relational contracting theory (Macaulay 1963, North 1990, Greif 1994, Kranton 1996) that informal relationships could substitute for formal contract enforcement through the judicial system, using data collected from the surgical instrument cluster in Sialkot (Pakistan). Inter-firm trust is thought to lead to reduced transaction costs (a passive benefit of a cluster). The study considered exchanges of goods between clustered suppliers and their customers, who were either members of the cluster or firms that interacted frequently with it. Inter-firm trust was measured as the amount of trade credit offered to customers[51]. The results showed that suppliers were more likely to offer trade credit when they believed in the effectiveness of formal contract enforcement and when they participated in business networks (proxied by inter-firm communication). There was also some evidence that customer lock-in (as measured by the duration of trading relationships) helped to develop inter-firm trust since firms gave more credit when relationships were of longer duration. This is because locked-in customers were typically less able to find alternate suppliers, and therefore less likely to renege on contracts.

6 - Conclusions

Industrial clusters provide employment for large numbers of people in developing countries, and have become significant exporters. Case studies highlighting the successes of developing country clusters in these respects have led to enthusiasm on the part of development practitioners about the prospects of clustering as a strategy to promote private sector development and reduce poverty. However, the relational contracting results in Thompson (2005b) are qualitatively (and in some cases quantitatively) similar to those obtained in studies of non-clustered firms.[52] Furthermore, social network-based relationships in clusters have been shown to have distortionary effects, as documented by Ilias (2001) and Banerjee and Munshi (2000). Therefore, policies to promote the development of industrial clusters should consider both the benefits and the drawbacks of clustering, and incorporate the lessons learned from these studies.

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[51] The survey instrument was adapted from the one developed in McMillan and Woodruff (1999) and Johnson, McMillan, and Woodruff (2002) to study relational contracting among (non-clustered) firms in Vietnam and Eastern Europe (respectively).

[52] This is only a tentative conclusion based on a comparison of the coefficient estimates of similar regressions conducted of clustered (Sialkot, this study) and non-clustered firms (Vietnam, McMillan and Woodruff (1999)). We cannot directly compare the magnitudes of coefficients because there was not a joint regression of clustered and non-clustered firms. Conclusive results comparing contract enforcement of clustered versus non-clustered firms would require further study.

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The Death of CAPM: A Critical Review

Nawazish Mirza[*] & Ghalia Shabbir[**]

I. Introduction

Most behavioral sciences based on rationality have simplistic assumptions; and the same is true about consumption or investment decisions. The aim of such studies is to maximize either utility or wealth. The entire 'financial economics' theory revolves around an investor who wants to maximize his return at some given level of risk. To determine the optimal return at a given level of risk or an optimal risk for a given level of return has been widely discussed in the financial literature consequently raising the issue of asset pricing in financial markets.

Asset pricing is one of the dominant themes in modern finance. The basis for asset pricing leads back to Bachelier's (1900) dissertation of "Theorie de la Speculation" submitted at the University of Paris (Sorbonne). He, in his classical work, recognizes that past, present and even discounted future events are reflected in market prices of financial assets, but often show no apparent relation to price changes. He concluded that if the market[1], in effect, does not predict its fluctuations, it does assess them as being more or less likely, and this likelihood can be evaluated mathematically. This gives rise to an analysis that anticipates not only Albert Einstein's subsequent derivation of the Einstein-Wiener process of Brownian motion, but also many of the analytical results that were rediscovered by finance academics in the second half of the twentieth century. The full potential of Bachelier's theory was only realized some 50 years later by Mandelbrot (1963) and Fama (1965). Their findings that the variance of returns is not constant over time (heteroscedasticity) and that the distribution of price changes were not Gaussian but leptokurtic, are among the foundations of modern financial theory. Fama concluded that the

[*] Assistant Professor (Finance) at Lahore School of Economics. I am thankful to Dr. Sohail Zafar who introduced me to the portfolio theory and Michel Levasseur of ESA de Lille, France who enhanced my understanding of asset pricing.
[**] Assistant Program Manager (Undergraduate) at Lahore School of Economics. The authors are thankful to an anonymous referee for valuable comments.
[1] The markets referred to in this paper are financial markets unless otherwise mentioned.

empirical distributions of share prices followed not a Gaussian but a Stable Paretian distribution with characteristic exponent less than 2, that is, with finite mean but infinite variance.

Following Bachelier, Markowitz (1952) proposed the idea of Portfolio Selection with variance of returns as a measure of risk. Building on Markowitz's work Tobin (1958) presented his separation theorem. According to Tobin, if an investor holds risky securities and is able to borrow or lend at risk free rate, then the efficient frontier is a single portfolio of risky securities plus borrowing and lending. Such an efficient frontier dominates any other combination of securities. Tobin's Separation Theorem separates the portfolio selection problem into first finding that optimal combination of risky securities and then deciding whether to lend or borrow, depending on investor's preference towards risk. He then showed that if there were only one risky portfolio plus borrowing and lending, the optimal portfolio would be the market portfolio. Markowitz and Tobin's modern portfolio theory (MPT) and its resultant asset pricing models have attempted to displace fundamental analysis as the only "truly scientific" approach to investment analysis, disregarding the emphasis on individual security appraisal.

Motivated by the quantitative logic of MPT, and its foundational quantitative specifications of utility and risk aversion, Fama's formulation of an equilibrium based efficient market hypothesis (EMH), and extensions utilizing aggregate market data such as Tobin's two-fund separation theorem, the advocates of economic positivism continued their search for an ultimate asset-pricing model. Sharpe (1964), Mossin (1966), and Litner (1965) brought us the first asset-pricing models based on EMH and MPT assumptions. Their work resulted in the capital asset pricing model (CAPM), which specifies the relationship between financial security return and risk (defined by the covariance of a security's historical return series with that of a representative risky market proxy). The relationship between risk and return specifies the appropriate market-clearing price. The CAPM contends that a security's required return has little or nothing to do with company and industry specific events, such as dividend announcements, stock splits etc, for these sources of risk are simply immaterial as they are easily diversified away by investors, all of whom are assumed to "rationally" hold Markowitz efficient portfolios. Although the academic advocates of the "scientific" approach to portfolio and investment management continue producing research to support the asset pricing models, the inherent deficiencies in the empirics lead to conflicting results. Under the CAPM framework, the relevant risk is the market risk that measures the returns sensitivity of a particular risky security or a portfolio of risky securities, to the returns of market portfolio. The CAPM is based on two fundamentals; a

true market portfolio and the market risk. The market portfolio, in its true sense, must include every marketable asset such as real estate, gold, ornaments, antiques etc. However, most of the empirical studies use stock indexes as a proxy for market portfolio. The inherent assumption behind this practice is that every event in the economy has an impact on the market index performance and consequently the return on index is a replication of return of true market portfolio. The use of proxy market portfolio and the behavior of market risk are very controversial, questioning the validity of CAPM.

The paper is organized as follows. Section II will provide a brief description of CAPM and its major assumptions. Section III will describe the empirical constraints, possible biases in estimation and some of the Beta correction methods. Section IV will describe a theoretical review on the validity of CAPM and Section V will provide some tentative conclusions.

II. Capital Asset Pricing Model – The Basics

The CAPM is a *ceteris paribus* model and is valid under a certain set of assumptions. Sharpe and Lintner assumed that all investors are risk averse individuals, having homogeneous expectations, who maximize the expected utility of their end of period wealth. Thus all investors have identical opportunity sets. They further assume that there exists a risk free asset and investors may borrow or lend unlimited amounts of this asset at a constant rate: the risk free rate and assets' returns are normally distributed. More importantly they assumed that all assets are perfectly divisible and priced in a perfectly competitive market. Another implicit assumption of CAPM is that there are no imperfections in the market such as taxes, regulations and restriction on short selling and the markets are frictionless with costless information available, simultaneously to all investors.

Although these assumptions appear to be too stringent to hold in the real world, but the criticism of CAPM cannot be attributed solely to its assumptions – though these assumptions have questioned the validity of the model from its onset. However, some studies have concluded that CAPM might hold even if some of the assumptions are relaxed. The study by Black, Jensen and Scholes (1972) has shown that even if the assumption of riskless borrowing and lending is violated, still a linear relationship was obtained between assets return and its relevant risk. This formulation of CAPM is known as zero Beta CAPM. Fama (1970), under certain assumptions, showed that the one period utility function is equal to the multi period utility and consequently the CAPM holds over time. Although the results suggested in favor of multi period CAPM, the underlying assumptions were more

inflexible than that of CAPM itself, making the issue more questionable. The assumptions underlying CAPM were not that critical in nature that could have led to impracticability of the model. Rather the model is criticized on its non conformity with reality and the inherent weaknesses in the empirical tests.

The CAPM framework is very simple under ideal conditions. The model states that the expected returns of an asset are a positive function of three variables: Beta, the risk free rate and the expected market return.

A simple CAPM equation can be written as

$$R_i = R_f + (R_m - R_f)\beta_i \ldots\ldots\ldots\ldots(1)$$

Where R_i = Return on Stock i, R_f = Risk free rate, R_m = Return on market portfolio and β_i = systematic risk (Beta) of stock i.

This above equation of CAPM can be written as a simple time series model that is normally used to estimate Betas in the CAPM context. This regression interpretation is

$$R_{it} - R_{ft} = \alpha_i + \beta_i \gamma_{it} + e_{it} \ldots\ldots\ldots\ldots(2)$$

where $\gamma_{it} = R_{mt} - R_{ft}$ and is known as market risk premium.

If the CAPM holds, the regression coefficient α_i, in the above time series model, must be zero. From the above equation, it is evident that systematic risk, attributable to its sensitivity to macroeconomic factors, is reflected in β_i; non-systematic risk, the unexpected component due to unexpected events that are relevant only to security, is reflected in e_{it}. The expected return on an asset depends only on its systematic risk. No matter how much total risk an asset has, only the systematic portion is relevant in determining the expected return on that asset.

The CAPM appears to be a simple model for estimation of expected returns or Beta coefficients but it becomes complicated when it is applied to investment practice. CAPM is one of the most extensively tested financial models in the literature. The major focus of these tests has been to check whether returns are statistically positively related to Betas. Hence, Beta is the *problem child* in the risk return relationship presented by Sharpe. The systematic risk as measured by Beta is mathematically the covariance of asset returns and market returns divided by the variance of the market returns.

Although Beta is a widely used concept yet it is still debated whether Beta is an appropriate measure of systematic risk.

Another popular model of estimating Betas is the market model or single index model. The studies of stock price behavior shows that when the market, as measured by a market index, rises most stocks' prices tend to increase. Similarly when the market is on a downside, the stocks in general lose their value. This observation suggests that the reason the stock returns are correlated might be because of a common response to the stock market. This correlation could be obtained by relating the return on stock to return on market index. Mathematically this could be expressed as

$$R_i = \alpha_i + \beta_i R_m + e_i \text{ ....(3)}$$

The α_i and e_i are the components of return of security i, and are independent of the market. They are random variables representing the returns insensitive to or independent of markets. We can relate this single index model to a portfolio also. Using the simple index model and replacing security *i* with a portfolio of securities P, we can represent the return on portfolio by

$$R_P = \alpha_P + \beta_P R_M + e_P \text{ ....(4)}$$

The return of a portfolio is the weighted average return of all the individual assets in the portfolio; so $R_P = \sum_{i=1}^{n} w_i R_i$, the formula will be as follows for an equally weighted portfolio

$$R_P = \frac{1}{n} \sum_{i=1}^{n} R_i = \frac{1}{n} \sum_{i=1}^{n} \left(\alpha_i + \beta_i R_M + e_i \right)$$

$$= \frac{1}{n} \sum_{i=1}^{n} \alpha_i + \left(\frac{1}{n} \sum_{i=1}^{n} \beta_i \right) R_M + \frac{1}{n} \sum_{i=1}^{n} e_i \text{ ......(5)}$$

Comparing equations (4) and (5), we can conclude that the portfolio return has sensitivity to the market returns, given by:

$\beta_P = \frac{1}{n} \sum_{i=1}^{n} \beta_i$, which is the average of the individual securities β_is, and has a non-market return component of a constant intercept:

$$\alpha_P = \frac{1}{n} \sum_{i=1}^{n} \alpha_i \, ,$$

which is the average of the individual alphas, and has zero mean variable:

$$e_P = \frac{1}{n} \sum_{i=1}^{n} e_i \, ,$$

which is negligible when *n* gets large.

If the portfolio P has all the stocks held in the market index and are held in the same proportion then the expected return on P must be $R_P = R_m$. If we look at the equation (3) of single index, without a standard error e, the only values for which we can have a guaranteed $R_P = R_m$, for any choice of R_m, is the intercept α_P equal to zero and a β_P equal to one. Thus, we can conclude that Beta of the market is one and the stocks riskiness, with respect to the market, will depend on their Beta values. If Beta of a stock is higher than one, it would be termed as more risky while if it has a Beta less than 1 it will be regarded as less risky than the market.

Beta is a measure of risk in equilibrium in which investors maximize a utility function that depends on the mean and variance of returns of their portfolio. The variance of returns is a questionable measure of risk for at least two reasons: First, it is an appropriate measure of risk only when the underlying distribution of return is symmetric. Second, it can be applied straightforwardly as a risk measure only when the underlying distribution of returns is normal. However, both the symmetry and the normality of stock returns are seriously questioned by the empirical evidence on the subject. The stability of Beta has also been a controversial issue in the literature. In reality only the historical returns are available to estimate Beta, which as a result will also be the historical Beta. There is a big question mark on using the historical Beta as an estimate of future Beta because empirically evidence shows that Betas on individual stocks have not been stable over time. A number of studies emerged to investigate the stability of Beta. The studies by Blume (1971), Baesel (1971), Roenfeldt *et al.* (1978) used different sets of data over various time periods and observed the change in Beta estimates through time. Their outcomes, in general, indicate that stock Betas are not stable. Furthermore, the evidence in 1990s (Fama and French, 1992, 1996; Jegadeesh 1992) indicates that Betas are not statistically related to returns, and concluded that Beta is dead and suspected the validity of Beta in measuring risk.

III. Estimation Biases and Limitations

a. Econometric Limitations

Whenever Beta is estimated there are certain methodological problems associated with the estimation. The three most basic econometric issues related with Beta estimation are:

1. The systematic risk or Beta estimates are based on *ex-ante* risk premiums, which are not directly observable. These estimates are based on rational expectations for an investor. Under rational expectation, the realized rates of return on assets in a given time period are drawings from the *ex-ante* probability distributions of returns on those assets. However, no logical justification can be given that investors will be rational over time.

2. Betas are normally estimated using linear regression. The underlying assumption for these estimates is the normal distribution of returns. However, in reality the normality of returns is not necessary. This gives rise to the issues of hetroskedasticity.

3. The third major problem relates to the observation of the proxy of market portfolio. In fact, many assets are not marketable and the proxies used for return on market portfolios exclude major classes of assets such as human capital, private businesses and private real estate. The most common assumption used to overcome this problem is by assuming that the disturbance terms from regressing the asset returns, on the return of the market proxy portfolio, are uncorrelated with the true market portfolio and that the proxy portfolio has a unit Beta. If the market proxy is a portfolio constructed from the individual assets or portfolios contained in the test sample, this assumption is equivalent to assuming that the market proxy is the minimum variance unit Beta portfolio of the set of all feasible portfolios constructed from the assets in the test sample.

b. Estimation Bias in Beta Coefficient

Beta is a measure of volatility between security returns and market returns. Beta is the security's responsiveness to market movements. The higher the fluctuation between the security returns and the market returns, the higher the systematic risk. The estimation of Beta using the CAPM framework or market model is not difficult. However, there are some issues

related to the goodness of the measure. The Beta estimates using the above mentioned models will be a suitable measure only if the stocks are actively traded. The active trading in the market helps the Beta coefficient to explain the risk associated with the particular stock. One important point to note is that it is not only the stock that has to be traded actively, but also the markets should be active. If, on the contrary, the stock is not actively traded or the markets are thin trading markets, the estimated Beta will not be a good estimation of the systematic risk of the stock. This requires correction of estimated Betas.

The use of the single-index model calls for estimates of Beta values for each stock that is a potential candidate for inclusion in a portfolio. Analysts could be asked to provide subjective estimates of Beta for a security or a portfolio. On the other hand, estimates of future Beta could be arrived at by estimating Beta from past data and using this historical Beta as an estimate of the future Beta. Beta is believed to have a value close to one, as figured from the market Beta value. A market Beta value is the weighted average of security Beta values in the market. If it is unbiased, the market Beta value will be equal to one. The market Beta value is calculated from equation (3), which assumed that the portfolio is the market itself. Testing the bias of Beta values can be accomplished by determining whether the market Beta value is close to one or not.

Beta commonly is obtained by using the Ordinary Least Square (OLS) estimation. In the OLS model, returns on a given security i are regressed against the concurrent returns of the market. Basically, such estimation has a disadvantage because it gives unstable and biased Beta (Scott and Brown [1980]). Biased Beta usually happens in thin-trading market. Thin-trading phenomenon that makes biased Beta is identical with non-synchronous trading that is caused by infrequent trading. In this sense, there might be some sleeping stocks. Non-synchronous trading problems arise in securities due to the time lag between the setting of market clearing prices for securities and the market index computed at the end of a discrete time interval, known as the intervalling effect. The OLS is a weak method of producing better Beta estimators (Berglund, Liljeblom and Loflund [1989]). Despite the common opinions, the supporters of the OLS Beta estimator still exist. Using New Zealand securities, Bartholdy and Riding (1994) concluded that OLS Beta estimates are found to be less biased, more efficient, and as consistent when compared with Dimson or Scholes-Williams estimators.

The adjustment to Beta values for non-synchronous trading activities is necessary. Most of the non-synchronous trading phenomenon happens in

emerging stock markets because in those markets the trade is low (thin). In most practices, not all securities are traded in the same interval, and some of them are not traded for a period of time. If there is no security transaction in a certain day, the security closing price for that day is actually the price from the previous day, which was the price the last time the security was traded. It could be two days ago, three days ago, or may be weeks ago. When such a price is used to calculate the market index of a day, the market index actually reflects the trading value of its previous days. If Beta is calculated using returns of a security and returns of a market index formed from security returns from different trading periods, the Beta will be seriously biased (Hartono and Surianto [2000]).

This phenomenon happens in almost all the emerging Stock Exchanges raising doubts on the estimation of Beta. The major problem is that shares listed on these exchanges are thinly-traded, thus leading to the problem of non-synchronous trading where the market's prices at the end of a period cannot be accurately matched with the prices of a thinly-traded share . Consequently, estimates of systematic risk of these shares will be biased. If the estimate of α_i and β_i is biased, the estimate of e_i will also be biased, and the extent of the bias will be more serious for more thinly-traded shares.

Barnes (1986) researched on this issue on the Kuala Lumpur Stock Exchange. He concluded that low-trading-volume market makes it hard for traders to react to new information. It will only make time for the market to absorb the full information.

Thin trading is a function of level of efficiency or vice versa. If a market has thin trading phenomena, it could be suspected to be at a lower degree of efficiency. Even so, some experts believe that non-synchronous trading problem is not as serious as some researchers contend. They think that the synchronous data are found to be less normal and has significant serial autocorrelation even though they exhibit significantly less hetroskedasticity, skewness, and kurtosis than non-synchronous data (Berry, Gallinger, and Henderson [1987]).

Upon pros and cons, the potential for bias in the OLS β_i due to non-synchronous trading has been recognized. For securities traded with trading delays different than those of the market, OLS β_i estimates are biased. Likewise, for securities with trading frequencies different than those of the market index, OLS β_i estimates are biased.

c. Beta Correction Methods

In an efficient market where prices are continuously formed, the problem of non-synchronous trading should not exist as every stock in the market would have registered a market clearing price at the discrete time of observing the market index, which is the average of all prices at that instant. A significant proportion of the stocks in a market, however, trades so infrequently that prices may be cleared on a few days in a typical month. This is the general behavior in developing countries. Consequently, the measured market prices and the market return deviates from the prices and returns of continuous trading.

Non-synchronous trading makes Beta biased. If the market Beta value obtained from the weighted average of individual Beta values is not equal to one, the adjustment to the Beta values is obviously necessary. There have been many methods suggested by researchers ((see Blume [1971], Vasicek [1973], Klemkosky and Martin [1975], Scholes and Williams [1977], Dimson [1979])) to adjust or correct the biased Beta. However, we will explain only three most widely recognized methods.

» Scholes - Williams Technique

Scholes and Williams (1977) developed a technique to correct the biased Beta caused by non-synchronous trading in a thin market. According to Scholes and Williams (1977), the problem in estimating Betas from daily returns lies in the observation that securities are not traded on a continuous basis. There are periods during which trading is halted for the day and also periods where the stock is inactive. In addition, these periods of inactivity are not distributed evenly over time. To compound the problem, some securities trade frequently while others infrequently, relative to the average security. These trading issues cause a "lag" effect in the true returns. In other words, observed returns will lag behind true returns when thin trading is present. As a result, Betas estimated from such returns are biased downwards. On the flip side, other securities trade about as frequently as the average security (i.e, the index against which the security's returns are measured). This situation causes a "lead" effect, and thus the estimated Betas are biased upwards. To correct the problem, Scholes and Williams determined that in order to estimate the true Beta, both the lead and lag effects must be taken into account. This is accomplished by calculating using OLS regression not only the observed Beta during period t (the time frame of interest) but also calculating the Beta during $t - 1$ (the lag Beta) and $t + 1$ (the lead Beta). In addition, the market lead Beta is also included in the

analysis. Once these regression estimators are found, the Scholes-Williams technique can determine a consistent, less biased estimator for the true Beta.

Scholes and Williams showed that the consistent Beta estimator which corrects for thinness of trading in a market when R_{jt} leads and lags R_{mt} (t being the time of measurement of the market returns) by n period is given by:

$$\beta j = \frac{\beta j^{-n} + ... + \beta j^{-2} + \beta j^{-1} + \beta j^{o} + \beta j^{+1} + \beta j^{+2} + ... + \beta j^{-n}}{1 + 2\rho 1 + 2\rho 2 + ... + 2\rho n}$$

where,

β_j = Beta stock j

β_j^0 = Beta estimated by OLS regression

β_j^{-n} = Beta lag n β_j^{+n} = Beta lead n

ρ = First order serial correlation coefficient between R_{mt} and R_{mt-1}

R_{mt} = market rates of return at time t

All the β_j^{-n}, β_j^{+n}, and β_j^0 are obtained from several OLS regressions within the estimation period with R_{m-n}, R_{m+n}, and R_m as variables.

» Dimson procedure

Dimson (1979) developed another method to adjust the Beta. This method simplifies the Scholes-Williams method by only using one multiple regression equation. He took a radical departure from these data intensive procedures by specifying lags and leads in a multiple regression as follows:

$$R_{jt} = \alpha_j + \beta_j^{-n} R_{mt-n} + ... + \beta_j^{-1} R_{mt-1} + \beta_j^0 R_{mt} + \beta_j^{+1} R_{mt+1} + ... + \beta_j^{+n} R_{mt+n} + e_{jt} \quad (6)$$

The corrected Beta value is the sum of multiple regression coefficients, so the method is also known as the Aggregate Coefficients Method (ACM). An important point to note is that the procedure is more efficient as there is no need for a series of simple regressions (as explored by Scholes and Williams).

$$\beta_j = \beta_j^{-n} + ... + \beta_j^{-2} + \beta_j^{-1} + \beta_j^{o} + \beta_j^{+1} + \beta_j^{+2} + ... + \beta_j^{+n}$$

The Dimson Beta regression model shows that the unbiased Beta is the sum of the slope coefficients in a regression of stock returns on lead, lag, and contemporaneous market returns. The number of lags and leads required in Dimson's procedure is determined by the convergence of the aggregated Betas to the expected value of one.

» Fowler - Rorke method

Fowler and Rorke (1983) developed a biased Beta correcting method which is enhanced from Dimson's. They argued that the Dimson's procedure will not provide consistent and unbiased estimators if the coefficients in equation (6) are simply aggregated without scaling them by weights. Therefore, the Fowler-Rorke method multiplies all the regression coefficients, resulting from Dimson's, each with the weighting factor before adding the regression coefficients.

The weighting factors to multiply n periods of regression coefficients are calculated as follows:

$$w_n = \frac{1 + \rho_1 + \rho_2 + ... + \rho_{n-1} + \rho_n}{1 + 2\rho_1 + 2\rho_2 + ... + 2\rho_n}$$

The values for ρ_n are generated from a regression equation as follows:

$$R_{mt} = \alpha_j + \rho_1 R_{mt-1} + \rho_2 R_{mt-2} + ... + \rho_n R_{mt-n} + e_t$$

The corrected Beta values using Fowler-Rorke method is gained from:

$$\beta_t = w_n \beta_j^{-n} + ... + w_1 \beta_j^{-1} + \beta_j^{0} + w_1 \beta_j^{+1} + ... + w_n \beta_j^{+n}$$

All these three methods are meant to seek market Beta value close to one. The adjustment techniques proposed by Scholes-Williams, Dimson, and Fowler-Rorke found that these techniques reduce a portion of the bias in β_i arising from thin trading and delays in price adjustments. For some researchers, particularly those who do research in emerging capital markets, the Fowler-Rorke method is believed to be the strongest one in reducing the bias.

Hartono and Surianto (2000) found that Fowler-Rorke's four lags and four leads is the best method in correcting Betas on the Jakarta Stock Exchange, after doing several tests with different lags and leads each.

Ariff (1987) examined Betas at Singapore Stock Exchange and suggested that given a reasonably large data set, the Dimson's method with Fowler Rorke's corrections is feasible for estimating unbiased Betas in thinly traded markets.

IV. On the Application of CAPM

The systematic risk or the Beta has been in the limelight since its inception in the 1960s. For the last 30 years academics and practitioners have been debating the merits of CAPM, focusing on whether the Beta is an appropriate measure of risk. Moreover, the stability of Beta has always been a concern in empirical studies. The test of CAPM is the observation of existence of a positive linear relationship between Beta and returns. Although the model postulates a positive trade off between Beta and expected returns, researchers, in general, always found a weak but positive relationship between Beta and returns over the sample period. Hence, they claimed that the results are inconsistent with the positive linear relationship between Beta and returns as prescribed by CAPM and the validity of CAPM is in question, questioning Beta as an appropriate measure of systematic risk.

Fama and MacBeth (1973) tested the validity of CAPM using a three step approach. In the first period, individual stocks' Betas are estimated and portfolios are formed according to these estimated Betas. In the second period, Betas of portfolios that are formed in the first period are estimated. In the final step, using data from a third time period, portfolio returns are regressed on portfolio Betas (obtained from the second period) to test the relationship between Beta and returns. They found a significant average excess return of 1.30% per month and on an average, for the period 1935 through 1968, a positive relationship exists between Beta and monthly returns. They concluded that the results support the CAPM in the US stock market and consequently Beta is a valid measure of systematic risk.

However, Fama and MacBeth (1973) only provided very weak support for a positive risk return trade off since the positive risk return relationship found is not significant across sub periods. Furthermore, when considering seasonal behavior of their results, the t-statistics for the study period becomes highly suspect and the basic risk return trade off virtually disappears. Reinganum (1981) found that the cross sectional differences in portfolio Betas, and the differences in average portfolio returns are not

reliably related. Thus the returns on high Beta portfolio are not significantly higher than the returns on low Beta portfolios, casting doubts on the Beta's behavior and CAPM.

Tinic and West (1984) found that January has a larger risk premium than the other months and further that the significant relationship between risk and expected returns only exist in January. When data for January months are excluded from the analysis of the risk return trade off, the estimates of risk premiums are not significantly different from zero. Thus, they concluded that their results reject the validity of CAPM. Lakonishok and Shapiro (1986) examined the monthly returns of all stocks traded on the New York Stock Exchange (NYSE) and found that return on individual security is not specifically related to its degree of systematic risk, but is significantly related to the market capitalization value. They concluded that the traditional Beta as well as the alternative (standard deviation) risk measure is not able to explain the cross sectional variation in return; only size can significantly explain it.

Haugen and Baker (1991) examined the risk and return characteristics of 1000 US stocks that have large capitalization over all US stock exchanges and markets between 1972 and 1989. They found that the market portfolio is not efficient because low risk stocks seem to have abnormally high returns, contradicting the relationship between Beta and returns as prescribed by CAPM. Fama and French (1992) studied the monthly average returns of NYSE stocks and found an insignificant relationship between Beta and average returns. They concluded that CAPM cannot describe the last 50 years of average stock returns and only market capitalization and the ratio of book value to market value have significant explanatory power for portfolio returns.

The stability of Beta has been another issue in the empirical literature. By stability it is meant that historical Beta can be used as an estimate for future Beta. Most of the studies on the stability of beta have somewhat similar conclusions. Levy (1970) examined individual US stocks, based on weekly returns, listed on NYSE and concluded that the Beta was not stable for individual stock over short periods. On the other hand, he observed that, in the case of a portfolio, the stability of Beta increased significantly. Further he concluded that the longer the period (over 26 weeks), the more stable is the Beta of the portfolio. The correlation he found among the Betas for 50 stock portfolios over a period of 26 weeks, was 0.91 and the Betas tended to regress toward the mean. Similar results were found by Fieltz (1974). They agreed that the stability of the risk, i.e. the Beta, substantially increases with an increase in portfolio size.

Another important factor that counts is how many months have been used to calculate the Beta. Baesel (1974) found that in the case of individual securities, the stability increases as the length of the estimation period increases. Altman, Jacquillat and Levasseur (1974) tested the Beta on French data with a different test period. They, in their comparative study with US markets, concluded that Beta was stable and stationary in the French market despite the market being smaller and less liquid. They also found an average correlation of 0.91 with portfolios as compared to 0.58 for individual securities. Moreover, as the test period increased the correlation also increased. The market model explained the same amount of variability of returns in US as well as French markets. A stable Beta can be observed by using a test period of over 120 months. However, for this, he assumed that Beta does not shift over time.

Ross (1976) suggested a multifactor model (arbitrage pricing theory) for asset pricing with far simpler assumptions than CAPM. He commented that asset pricing should not be attributed solely to a single factor (Beta of CAPM) rather it is a function of various economic factors. Arbitrage Pricing Theory (APT) holds that the expected return of a financial asset can be modelled as a linear function of various macro-economic factors, where sensitivity to changes in each factor is represented by a factor specific Beta coefficient. The model derived rate of return is then used to price the asset correctly - the asset price should equal the expected end of period price discounted at the rate implied by the model. If the price diverges, arbitrage should bring it back into line.

The APT differs from the CAPM in that it is less restrictive in its assumptions. It allows for an explanatory (as opposed to statistical) model of asset returns. It assumes that each investor will hold a unique portfolio with its own particular array of Betas, as opposed to the identical "market portfolio". Additionally, the APT can be seen as a "supply side" model since its Beta coefficients reflect the sensitivity of the underlying asset to economic factors. Thus, factor shocks would cause structural changes in the asset's expected return.

All the above studies suggest very weak or no relationship of Beta with the expected return. The most important point to be considered is that all these studies have been testing the "synthetic CAPM" and due to non observation of the real market portfolio, it is impossible to test the actual CAPM. The use of the proxy portfolio can be seriously flawed if the proxy index is dominated by some stocks. In this case the return of the index portfolio is performance of such heavy weights and does not reflect the performance of the true market portfolio. Furthermore the bias

intervention and difference in estimation methods of Beta across various financial markets makes the model more controversial.

V. Some Tentative Conclusions

Despite all the arguments and evidence against the CAPM, it is very difficult to give an unambiguous conclusion. On the one hand there is strong evidence against the model while on the other hand the inability to observe the true market portfolio leaves us with a synthetic CAPM. Thus all the evidence against CAPM actually discard synthetic CAPM as original CAPM per se is not testable. The Anti CAPM club, led by Fama, is a major setback in itself; because Fama, till the early 90's, has been a great supporter of CAPM. The failure of the CAPM has fuelled an ongoing debate over the correct paradigm of asset pricing. Even if we disregard the fact that prices are determined by subjective valuations of individuals and cannot be measured by cardinal numbers, diligent work has continued to (1) Salvage CAPM by reformulating it (i.e. Intertemporal CAPM), (2) Create new equilibrium models based on far different assumptions (Arbitrage Pricing Theory) or (3), Show that human behavioral constraints limit the ability of investors to act rationally and call for efforts to create a new or radically modified asset pricing paradigm.

Another factor contributing towards the "reports of death of CAPM" is that empirical and market tests of quantitative models provide little support for usefulness in real world applications. Utilizing a world of certainty (evenly rotating economy) for deducing crucial economic insights is a valuable tool for testing economic theory, but wrought with problems when considered descriptive of actual human actions. When economists attempt to supplant human based systems with artificial quantitative models they encounter a host of insurmountable methodological problems due to the variability and complexity of past, present, and future economic environments. Nevertheless, financial economists persist in assuming that the real world can be replicated in asset pricing models. What are especially troubling are the methodological violations in formulating these so-called theories of asset pricing in spite of the continued failures of such models in applications.

However, despite all this, the investment analysts, mutual fund managers, researchers etc, will still have to work with the proxy index, some form of Intertemporal CAPM or APT for the foreseeable future till a model can be suggested that is free from methodological, estimation and calculation biases.

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A Comparison of Domestic Vs Foreign Banks Using Stochastic Frontier Approach

Adiqa Kiani[*]

I. Introduction

In a globalized world in which the structures of the financial service industries are changing rapidly and becoming more and more competitive, the cost efficiency of financial institutions along with better quality of service have assumed crucial significance for their long-term sustainability. Hence, the nature of efficiency of financial institutions will determine the prospects of their success in meeting the challenges of a globalized world.

The commercial banks in Pakistan are also facing the challenges of increased competition from foreign commercial banks while their operations over the years have also been called into question. However, the literature, which deals with questions of cost efficiency of commercial banks in Pakistan in a professional manner is scant. The information on relative technical efficiency of commercial banks, if available, can be helpful in designing policy for this important sector.

The fact of the matter is that Pakistan's banking sector and financial institutions are under a great deal of pressure to maintain their profitability. The banks' difficulties relate to inadequate productivity, high intermediate costs of funds, huge expenditure on establishment, over-staffing, large number of loss making branches and management of funds [Klien 1992].

In addition, there is high incidence of loan default. The stuck-up loan portfolio of banks/DFIs has been a source of major concern for the overall financial health of the banking system in the country. Defaulted loans, which were Rs. 146.1 billion as of 30th June 1998, have been marginally reduced to Rs. 134.8 billion in December 1998 [Government of Pakistan (1999b)].

Economic efficiency can be decomposed into two basic components: technical efficiency and price efficiency (allocative efficiency). A firm is said to

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[*] Assistant Professor, Department of Economics, Federal Urdu University of Arts, Science & Technology, Islamabad.

be technically more efficient than another firm if it can produce more output using a given amount of inputs as compared to another firm [Yotopulas and Lau 1973]. In other words, it implies that quantifying differences in technology[1] can capture differences in technical efficiency. A profit-maximizing firm is regarded as an allocatively efficient firm where profit maximization means that the marginal cost of the firm will be equal to marginal revenue of the firm. If there are differences in the economic efficiency of two firms then it might be either because of technical or price inefficiency.

Technical efficiency has been cited widely as one of the major sources of change in the financial sector industry (Anderson, 1993). However, only a few studies have attempted to investigate the relative technical efficiency especially for the banking sector of Pakistan. This study has two distinct goals. First, investigating the relative technical efficiency of commercial banks operating in Pakistan including Pakistani banks and foreign banks. Second, to make comparisons between them using the stochastic cost frontier approach. This technique can show how efficient cost varies among different banks with service provision, and how actual cost departs from efficient cost. Such a comparison is of particular interest because in this way we will be able to analyze the relative efficiency of banks. In addition, we can also analyze year wise relative performance of the banking sector in Pakistan.

The organization of the Study is as follows. Section 1.2 reviews the existing empirical studies on the banking sector. Section 1.3 discusses the methodology of our model, sources of data, specification of inputs and output of the banking sector and construction of different variables. Section 1.4 gives the interpretation of the results on the cost structure of the banking sector. Finally, Section 1.5 consists of summary and concluding remarks.

2. Empirical Studies on the Banking Sector

There are various approaches to the measurement of efficiency discussed above which have been applied to measure technical efficiency of banks. In this section, we present a review of these studies.

Aly *et al.* (1990) analyzed the nature of technical, scale and allocative efficiency of banks in the United States. They used the non-parametric technique to estimate overall allocative and technical efficiency for the year 1986 of 322 banks and found a low level of overall efficiency. On average, the

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[1] In the perspective of banking efficiency, technology implies computers, the new service products that banks may offer. ATM (Automatic Teller Machine), Credit cards, travelers' cheques and other money market accounts are included in the new service products.

banks were found to be scale efficient while technical efficiency was found to be negatively related to product diversity, and positively related to the extent of urbanization.

Ferrier and Lovell (1990) studied cost efficiency in the US banking sector. They compared the ability of the econometric and linear programming techniques to reveal the structure of cost efficiency in the banking sector. Their parametric results show that technical inefficiency raises cost by 9%, on average, while the allocative inefficiency raises cost by 17%. The non-parametric results showed that technical inefficiency was 16% on average while allocative inefficiency raises cost by 5% and follows a decreasing trend as the bank size increases.

Yuergert (1993) made important contributions to the literature on efficiency in financial services. First, he showed estimates of fixed error cost frontier in which the variance of both the normal and gamma distribution can vary with firm size. Second, he extended the literature on life insurance scale and product mix economies by incorporating and measuring X-inefficiency[2]. Third, comparison of normal and gamma estimates with other methods explained few drawbacks of gamma distribution. Yuergert used cross section data of 805 companies for the year 1989 and the translog cost function in estimation. His results showed that there was a substantial amount of X-inefficiency in the industry, but the difference across firm's size was insignificant.

Zardkoohi and Kolari (1994) analyzed empirical estimates of scale and scope economies for 615 branch offices representing 43 saving banks in Finland for the year 1988. A standard translog cost analysis was used to obtain estimates of both economies of scale and scope for different asset sizes. Their result suggested that there are economies of scale for individual branch offices.

Favero and Papi (1995) analyzed efficiency of the Italian banking sector. They used both parametric and non-parametric methods to make a comparison between these two approaches on a sample of 174 Italian banks for the year 1991. Banks included in that sample cover approximately 80% of the total deposits in Italy and they found that the Italian banking industry features high variability in all the cost and profitability indicators.

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[2] X-inefficiency is defined as deviation from the efficient frontier. That is differences in managerial ability to control costs or maximize revenue to be greater than the cost effects of the choice of scale and scope of production.

Musleh-ud-Din *et al.* (1996) examined the scale and scope efficiency of the Agriculture Development Bank of Pakistan. Using the production approach to measuring the bank's costs and outputs, a translog cost function is estimated. They used the survey data of 341 branches of the ADBP for the years 1991-1995. Their result showed that the bank's production technology exhibits both overall and product-specific economies of scale. Second, even though bank branches in all size categories enjoy economies of scale, the extent of such economies is larger for branches operating at a smaller scale of production. This implies that as the bank branches grow larger in size in terms of both loan and deposit accounts, they move closer to attaining constant returns to scale. Third, the marginal costs of servicing both loan and deposit accounts decline, as bank branches grow larger in size in terms of either the number of loans or the number of deposits. Finally, their result showed the bank's production technology is characterized by cost complementarity, i.e., there exist scope for cost savings through the joint production of loans and deposit accounts.

Chang *et al.* (1998) conducted a comparative analysis of productive efficiency of foreign-owned multi-national banks (FOMNB) and US-owned multinational banks (USMNB) operating in the US for the years 1984-1989. They used translog stochastic cost frontier approach in their analysis. Their results indicate that average inefficiency score of the US multi-national banks at 21.0% was significantly lower than the average inefficiency score posted by the foreign owned multi-national banks at 27.0%. The most inefficient banks were FOMNBs with foreign ownership exceeding 50%. They found that the larger the foreign presence in terms of ownership, the more inefficient the bank was.

Altunbas *et al.* (1999) estimated the impact of technical change on the costs of European banks using the stochastic cost frontier. The data set of 3779 banks, based in 15 European countries, for the year 1989 to 1996 was used. Technical change is decomposed into pure, scale augmenting and non-neutral components. The results suggest that the annual rate of total cost reduction, attributable to technical change, to be very strongly correlated with the bank size. For representative banks operating with all outputs and inputs at their 1996 sample mean values within each size bank, the 1996 rates vary from 0.6% for the smallest banks, through 1.2% and 4.9% for the two intermediate size banks, to 6.7% for banks in the largest size bank.

The literature reviewed in this section shows that considerable advance has been made in the literature on banking efficiency in developed countries. However, no such effort has been made to estimate the relative

efficiency of commercial banks in Pakistan. Non-parametric linear programming technique has remained popular in the existing studies. However, one of the major shortcomings of the non-parametric DEA models is said to be their non-stochastic nature. Consequently, the efficiency scores obtained from these models may be contaminated, depending upon the nature and extent of the statistical noise in the data sets. Thus, development of stochastic DEA models is crucial for research on the DEA frontier. Recently, Land, Lovell, and Thore (1988), have developed stochastic DEA models but without much success. The problem seems to be the substantial requirements to implement these models, which creates a practical difficulty in the use of this approach. The biggest advantage of the stochastic frontier approach is that it introduces a disturbance term representing random error and exogenous shock beyond the control of the production unit. The computation involved is not trivial, but it does not seem to have hindered the empirical implementation of the model.

3. Methodology and Data

a. Methodology and Estimation Procedure

This study uses a methodology, which allows for the calculation of the technical efficiency of a bank assuming allocatively efficient banks. Basically, this involves the construction of a best practice cost frontier through the use of stochastic cost frontier. The technical efficiency of each bank is then measured relative to this frontier.

To estimate technical efficiency of commercial banks in Pakistan, we employed the stochastic cost frontier approach of Aigner, Lovell and Schmidt (1977) the translog technology, assuming half-normal distribution for one-sided error. The standard properties of stochastic cost frontier model are illustrated below.

A bank's cost function can be written as

$$C = (Y_i, W_k) + \varepsilon_i \qquad\qquad i = 1, \ldots, n \qquad\qquad (1)$$

where C represents total costs, Y_i represents various products or services produced, W_k represents the prices of inputs used, and ε represents a random disturbance term, which allows the cost function to vary stochastically. The uncertainty in the cost function can be further decomposed as

$$\varepsilon_i = u_i + v_i \qquad\qquad (2)$$

In Equation 2, v represents random uncontrollable factors that affect total cost. The error component u_i is assumed to be distributed independently of v_i. The term u, on the other hand, represents individual bank's cost deviations or errors, which are due to factors that are under the control of the bank management such as technical efficiency derived from a $N(0, \sigma^2_u)$ distribution truncated below zero i.e. $u_i \leq 0$

We assume that the banks use inputs, $x = (x_1, x_2, ..., x_n)$, available at fixed prices, $w = (w_1, w_2, ..., w_n)$, to produce the output y. For our purpose, we take the simple translog cost function envisaged as a second order Taylor's series approximation in logarithmic form to an arbitrary cost function. Incorporating the time trend, the translog cost function is written as

$$\ln C = \alpha_0 + \sum_i \alpha_i \ln Y_i + \sum_k \beta_k \ln W_k + \theta_t t + \sum_k \theta_{kt} t \ln W_k + \sum_i \theta_{it} t \ln Y_i +$$

$$\frac{1}{2}\sum_i \sum_j \alpha_{ij} \ln Y_i \ln Y_j + \frac{1}{2}\sum_k \sum_h \beta_{kh} \ln W_k \ln W_h + \sum_i \sum_k \gamma_{ik} \ln Y_i \ln W_k +$$

$$\frac{1}{2}\theta_{tt} t^2 + \varepsilon_i \qquad\qquad (3)$$

where, $ln\ C$ = Natural log of total cost, Y_i = ith output, W_k = kth input price, ε_i = disturbance term. For a cost function to be well behaved, it must be homogeneous of degree 1 in prices for each level of output. It implies the following restrictions on the translog cost function

$$\sum_k \beta_k = 1 \qquad\qquad (4)$$

$$\sum_k \beta_{kh} = \sum_h \beta_{hk} = \sum_i \gamma_{ik} = \sum_i \theta_{it} = 0 \qquad\qquad (5)$$

The symmetry on the cross-price effect implies $\alpha_{ij} = \alpha_{ji}$ and $\beta_{kh} = \beta_{hk}$

The log likelihood function for N observations for the half normal distribution is written as

$$Ln = N \ln \frac{\sqrt{2}}{\sqrt{\Pi}} + N \ln \sigma^{-1} + \sum_{i=1}^n \left[1 - F^*\left(\varepsilon_i \lambda \sigma^{-1}\right)\right] + \frac{1}{2}\sigma^2 \sum_i^n \varepsilon_i^2 \qquad (6)$$

where F^* represents cumulative distribution function, and $\lambda = \dfrac{\sigma_u}{\sigma_v}$.

The firm specific estimates of u_i are obtained indirectly by making use of the expected value of u_i conditional on the composed error. This method was suggested for the half-normal and exponential distributions. To illustrate, for the half-normal distribution, the mean of the conditional distribution of u_i given ε is written as $E(u / \varepsilon) = \mu_* + \sigma_* \dfrac{f(-\mu_* / \sigma_*)}{1 - F(-\mu_* / \sigma_*)}$, where f and F represent the standard normal density and cummulative normal distribution function, respectively.

where $\sigma_* = \sqrt{\dfrac{\sigma_u^2 \sigma_v^2}{\sigma^2}}$, $\sigma^2 = \sigma_u^2 + \sigma_v^2$, and $\sigma_v^2 = \dfrac{\sigma^2}{1 + \lambda^2}$.

b. Data and Variable Construction

We use four basic inputs for the banking sector, which are labor, deposits, occupancy cost, and operating expenses. We take two outputs, measured as loans and advances and investment. The inputs are defined as X_1 = total expenditure on salaries and other benefits, X_2 = operating cost including postage, printing, stationary charges and other expenditures, X_3 = occupancy cost including rent, taxes, insurance charges and depreciation on bank's property, and X_4 = Total Deposits. The outputs are defined as Y_1 = Loans and Advances, and Y_2 = Investment. The input Prices are defined as W_1 = total expenditure on salaries and other benefits / total deposits, W_2 = operating cost / total deposits, W_3 = occupancy cost / total deposits, and W_4 = total interest paid on deposits / total deposits. Then total cost function is defined as

$C = X_1 + X_2 + X_3 + W_4.X_4$

As can be noticed from the above due to non-availability of data on the number of employees in the banking sector, the price of labor, W_1 is obtained by dividing total expenditure on salaries by total deposits.[3]

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[3] To construct price of labor, data on the number of bank employees was not available in published form. As a proxy measure for employees, we have divided total expenditures on salaries and other benefits by total deposits. By doing so, we assume a high positive correlation between the number of employees and bank deposits. This may not be a

Similarly, the prices of operating cost and occupancy cost are obtained by dividing by total deposits. Our sample includes 18 banks, which cover almost 90% of the activities performed by the banking sector. Eleven banks could not be included in our sample because they were mostly newly established banks and very short time-series of the required data. The data set used here is balanced panel data, which was another motivation for us to exclude newly established banks from the included sample. Our sample includes nine Pakistani banks, nine foreign banks and the period covered is from 1976-1996. For the purpose of estimation, we use this balanced panel data and converted it into 1980 prices using own country's GDP deflators. Estimation of indices using 1980 as the base year is also incorporated. The required time series data was obtained from the State Bank Pakistan's annual *Banking Statistics of Pakistan*. The data on GDP deflator was obtained from *The Pakistan Economic Survey.*

4. Estimates of Technical Efficiency of Commercial Banks

In this section, we present and discuss the empirical results of the stochastic cost frontier for Pakistani and foreign owned commercial banks operating in Pakistan.

a) *Maximum Likelihood Estimates of the Stochastic Cost Frontier*

Given the management structure of commercial banks with Pakistani origin vis-à-vis foreign commercial banks in Pakistan, the mean technical efficiency of Pakistani banks is generally expected to be less than the foreign commercial banks. More specifically, due to nationalization of private commercial banks in Pakistan in the early 1970s, they were managed by the public sector for most of the study period. It is common knowledge that publicly owned commercial banks have frequently been used to push the political agenda of the rulers. As a result, the problems of over employment of staff, bad loans, loan write-offs, excessive branch networks, insufficient performance incentives and political interference inefficiencies have often been reported in the Pakistani press. In contrast, the functioning of commercial banks with foreign origin was based on a highly competitive and professional management structure. Due to their strong linkages with parent banks abroad, these banks hired highly qualified professional staff and introduced market-oriented work norms. Better professional services and consistent policies rapidly increased their credibility in the eyes of Pakistani customers and profits. Hence they are expected to have more efficient cost structures than their Pakistani counter parts.

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perfect measure but one of the alternatives till the time that published time series on bank employees may be available.

To make a comparison of technical efficiency of respective subgroups of commercial banks, we maximize three log-likelihood functions to obtain technical efficiency scores. First we take the full sample, and then take sub-samples of commercial banks with Pakistani and foreign origins.

The full sample is a balanced panel data of 18 commercial banks from 1976-1996, while the two sub-samples consist of data on 9 commercial banks each again from 1976-1996, but for banks with Pakistani and foreign origins, respectively. Hence we estimated three log-likelihood functions in (6). The maximum likelihood parameter estimates for the stochastic translog cost frontiers by imposing homogeneity and symmetry restrictions for the full sample as well as sub-samples of Pakistani and foreign banks are presented in Table1. We can see from Table1 that most of the estimated parameters are statistically different from zero. The estimated parameters associated with time are mostly significant in all the three models, which implies that technical change has an impact on the efficiency structure of banks. The time trend parameters, θ_t and θ_{tt}, indicate the direction and rate of change of shift in the cost function independent of prices and outputs.

The estimated model for Table 1 is written as

$$\ln C = \alpha_0 + \sum_{i=1}^{2} \alpha_i \ln Y_i + \sum_{k=1}^{4} \beta_k \ln W_k + \theta_t t + \sum_{k=1}^{4} \theta_k t \ln W_k + \sum_{i=1}^{2} \theta_{ti} t \ln Y_i +$$

$$\frac{1}{2} \sum_{i=1}^{2} \sum_{j=1}^{2} \alpha_{ij} \ln Y_i \ln Y_j + \frac{1}{2} \sum_{k=1}^{4} \sum_{h=1}^{4} W_k W_h + \sum_{i=1}^{2} \sum_{k=1}^{4} \ln Y_i \ln W_k$$

$$\frac{1}{2} \theta_{tt} t^2 + \varepsilon_i$$

with all the restrictions mentioned above in equation 5 to 6.

In Table-1 for the full sample, θ_t is negative, indicating that the cost function is shifting inward independent of changes in factor prices and output, although no statistical significance could be attached to this time shift. However, θ_{tt} is positive and significant. For Pakistani banks, θ_t is negative and statistically significant while θ_{tt} is positive and significant, which indicates that the cost function is shifting inwardly at an increasing rate. In other words, Pakistani banks have a pattern of increasing their cost

efficiency with the passage of time. However, negativity of θ_t and θ_{tt} in the case of foreign banks shows that foreign banks seem to have benefited from reduction in costs attributable to technical change at a decreasing rate during the period 1976-1996.

Table1- Maximum Likelihood Parameter Estimates for the Translog Cost Frontier, 1976-1996

Parameter	Full Sample	Pakistani Banks	Foreign Banks
α_0	-0.47 (-0.49)	-3.79 (-0.38)	3.62 (0.99)
α_1	0.82 (2.09)**	3.29 (4.07)**	0.92 (1.90)*
α_2	1.53 (6.84)**	0.24 (0.63)	0.87 (3.30)**
α_{11}	0.11 (1.12)	-0.38 (-3.47)**	-0.23 (-0.95)
α_{12}	-0.21 (-5.13)**	-0.21 (-3.03)**	0.07 (0.44)
α_{22}	0.13 (3.25)**	0.37 (8.02)	-0.12 (-0.98)
♣ β_1	0.96 (3.21)**	3.18 (5.60)**	0.28 (1.34)
β_2	-0.12 (0.66)	0.69 (3.50)**	-0.02 (-0.06)
β_3	-0.49 (-1.73)**	-1.50 (-3.37)**	-1.51 (-4.01)**
β_4	0.65 (3.34)**	-0.41 (-1.93)*	3.25 (8.67)**
β_{11}	-0.27 (-5.44)**	0.09 (0.69)	-0.23 (-5.34)**
β_{12}	0.21 (5.44)**	-1.05 (-6.64)**	0.08 (0.11)
β_{13}	-0.04 (-0.69)	0.35 (6.26)**	0.19 (1.66)*
β_{14}	0.10	0.61	0.03

	(3.42)**	(10.07)**	(0.77)
β_{22}	-0.05 (-0.72)	0.89 (8.26)**	-0.04 (-0.28)
β_{23}	-0.02 (-0.33)	0.28 (**5.36**)**	-0.01 (0.09)
β_{24}	-0.14 (-**5.17**)**	-0.12 (-2.87)**	0.04 (0.53)
β_{33}	-0.05 (-1.23)	-0.09 (-3.47)	-0.01 (0.10)
β_{34}	0.11 (3.07)**	-0.54 (8.25)**	-0.17 (-3.58)**
β_{44}	-0.07 (-3.65)**	0.06 (3.39)**	0.10 (3.39)**
γ_{11}	-0.29 (-**5.64**)**	-0.56 (-5.67)**	-0.18 (-**5.59**)**
γ_{12}	0.20 (7.58)**	0.15 (5.88)**	0.13 (5.62)
γ_{13}	0.08 (1.26)	0.09 (0.08)	0.21 (3.42)**
γ_{14}	0.06 (0.13)	0.42 (9.36)**	-0.16 (-1.64)*
γ_{22}	-0.18 (-**5.69**)**	-0.19 (-4.90)**	-0.15 (-3.69)**
γ_{23}	0.03 (0.86)	0.25 (6.06)	0.12 (1.39)*
γ_{24}	-0.05 (-1.73)**	-0.21 (-5.19)**	-0.11 (-1.75)**
θ_t	-0.07 (-0.21)	-0.18 (-3.40)**	-0.36 (-9.30)**
θ_{tt}	0.04 (-3.57)**	0.08 (-5.69)**	-0.08 (-6.92)**
θ_{1t}	0.01 (3.40)**	0.11 (9.71)**	0.03 (**5.30**)**
θ_{2t}	0.0002	-0.07	-0.04

	(0.004)	(-9.07)**	(-0.53)
θ_{3t}	-0.02 (-3.57)**	-0.05 (-7.28)**	-0.02 (-2.03)**
θ_{4t}	0.07 (3.56)**	-0.05 (2.00)**	-0.02 (-1.41)*
θ_{t1}	-0.03 (3.94)**	-0.09 (0.65)	0.07 (4.84)**
θ_{t2}	-0.02 (-3.68)**	-0.04 (-6.39)**	0.03 (-0.27)
σ_1	3.188 (0.56)	5.02 (0.66)	5.88 (0.85)
Log-likelihood[a]	64.87	-276.51	-190.91
N	378	189	189

Notes: [a] The convergence for the log-likelihood function was achieved after 83 iterations at 0.001 tolerance level for the full sample, after 36 iterations for the sample of Pakistani banks and after 21 iterations for the sample of foreign banks.

*   Significant at the 10% level. ** Significant at the 5% level.

♣The parameter estimates were obtained by imposing the homogeneity and symmetry restrictions in all the three models.

The θ_{it} parameters represent the share of inputs into the total cost. θ_{it} significant for the first, third and fourth inputs in the case of full sample implies increasing share of costs of labor and deposit and declining share of occupancy cost in the total cost which suggested that technological change in the case of the full sample was labor and deposits using and occupancy cost saving. However, for the Pakistani banks these parameters show that the technological change was labor using and operating cost, occupancy cost and deposits saving. In the case of foreign banks, significance of all the four parameters for θ_{it} inputs imply increasing share of operating cost and decrease in the share of labor, occupancy cost and deposits in the total cost, which suggested that technological change for the foreign banks was operating cost using, but labor, occupancy cost and deposits saving. We also found that variations in revenue shares were inversely related to time since the cross terms

between output and time (i.e., θ_{t1} and θ_{t2}) were negative and statistically significant for the full sample. However, for the Pakistani banks only θ_{t2} shows the significant result, while for foreign commercial banks variations in revenue share were directly related to time as shown by positive but significant parameters of θ_{t1} and θ_{t2}.

b) Comparing Mean Technical Efficiencies

The mean technical efficiency is obtained by $E(u_i / \varepsilon_i)$. Banks that are away from the cost frontier are not efficient because they incur higher cost per unit of output. Table-2 to 4 present mean efficiency scores for the three samples calculated by using stochastic cost frontier technique along with the ranking of banks. For convenience of comparison, commercial banks are assigned ranks according to their average mean efficiency scores. We find that technical inefficiency of banks in the full sample in the individual years ranges from 70 % to 90 % levels. It shows the efficiency relative to the banks within the sample. Few banks have performed well and comparison of the banks included in our sample is only with those banks performing well.

For purposes of comparison, Table-2 also gives information on mean efficiency levels for different years as well as the average for the whole sample. For instance, the bottom row shows that the least technical efficiency was observed in 1995 and most technical efficiency was observed in the years 1977 and 1978. In other words, for our study period technical efficiency was highest at a 96% level in 1977 and 1978 and lowest at a 86% level in 1995. The last column shows the ranking of different banks, which indicates that Deutsche Bank was technically the most efficient commercial bank while the Punjab Provincial Bank for Co-operatives was least efficient. When ranking pattern is taken into account it appears that, placed at number 4, the most efficient Pakistani bank was the National Bank of Pakistan from amongst the list of 18 banks. To illustrate, these rankings indicate that had the Punjab Provincial Bank for Co-operatives been fully efficient, its costs could have been decreased by 11% per annum for the entire study period. We also find that the least efficient bank with foreign origin was American National Trust and Saving Association. As expected, technical efficiency of commercial banks with Pakistani origin were found to be much less than the banks with foreign origin.

Table-2: Ranking of Banks Based on their Mean Technical Efficiency Scores: Full Sample, 1976-96

Banks /Years	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Average	Rank
1. Deutsche Bank	.98	.98	.95	.94	.97	.98	.91	.98	.98	.96	.97	.96	.96	.94	.93	.92	.91	.91	.91	.84	.96	.974	1
2. American Bank	.97	.97	.96	.95	.94	.93	.93	.93	.95	.93	.94	.97	.96	.93	.94	.90	.86	.84	.90	.91	.91	.955	2
3. African Bank	.98	.98	.96	.95	.95	.95	.92	.94	.96	.95	.92	.93	.95	.89	.83	.86	.87	.90	.84	.94	.93	.948	3
4. National Bank of Pakistan	.95	.96	.96	.95	.94	.93	.95	.93	.95	.95	.93	.93	.93	.93	.92	.98	.89	.87	.86	.85	.84	.947	4
5. Muslim Bank	.94	.95	.96	.95	.94	.92	.91	.91	.93	.93	.92	.92	.99	.89	.88	.89	.90	.93	.89	.90	.90	.946	5
6. Habib Bank	.96	.95	.95	.94	.94	.93	.94	.97	.94	.94	.93	.94	.94	.92	.90	.91	.89	.90	.88	.87	.91	.945	6
7. Allied Bank of Pakistan	.93	.94	.95	.96	.92	.91	.91	.92	.92	.93	.94	.89	.93	.92	.94	.91	.91	.94	.93	.90	.90	.943	7
8. Federal Bank for Co-operatives	.97	.95	.95	.95	.94	.96	.95	.95	.98	.80	.86	.72	.75	.95	.98	.97	.96	.98	.96	.98	.98	.942	8
9. United Bank Limited	.95	.96	.96	.95	.94	.93	.94	.93	.94	.93	.94	.93	.91	.90	.89	.89	.87	.87	.85	.84	.82	.933	9
10. Industrial Development Bank of Pakistan	.92	.98	.98	.95	.97	.94	.91	.88	.89	.92	.93	.93	.93	.91	.88	.87	.89	.88	.90	.84	.86	.932	10
11. Bank of Tokyo	.96	.95	.94	.94	.93	.94	.94	.92	.90	.89	.96	.85	.87	.85	.84	.88	.88	.86	.86	.85	.97	.925	11
12. Bank of India	.99	.98	.97	.94	.92	.96	.94	.90	.90	.93	.89	.85	.88	.84	.87	.88	.80	.80	.85	.77	.87	.915	12
13. Standard Chartered Bank	.94	.95	.96	.94	.92	.91	.92	.94	.93	.90	.89	.87	.87	.85	.82	.83	.86	.84	.84	.84	.96	.913	13
14. Agricultural Development Bank of Pakistan	.99	.99	.98	.97	.94	.65	.93	.93	.93	.87	.85	.86	.92	.89	.85	.90	.88	.88	.89	.84	.84	.911	14
15. Algemene Bank of Netherland	.98	.96	.97	.96	.94	.91	.89	.86	.87	.85	.87	.87	.85	.90	.85	.77	.81	.78	.91	.85	.97	.90	15
16. Rupali Bank	.98	.97	.96	.93	.94	.91	.89	.90	.93	.92	.92	.90	.90	.82	.84	.85	.84	.78	.75	.76	.70	.897	16
17. American National Trust and Saving Association	.96	.96	.95	.96	.94	.92	.91	.89	.89	.90	.90	.88	.87	.88	.82	.82	.81	.78	.77	.76	.81	.895	17
18. Punjab Provincial Co-operative Bank	.73	.83	.90	.86	.94	.88	.87	.83	.91	.92	.95	.95	.88	.88	.85	.86	.88	.89	.86	.91	.91	.891	18
Average	.95	.96	.96	.94	.94	.91	.92	.92	.93	.91	.92	.90	.90	.89	.88	.88	.87	.87	.87	.86	.89	.975	

Note: To obtain the percentage (%) efficiency, the efficiency scores were transformed by $1/1 + \mu_i$. In this transformation the most efficient bank has a score of 1 and the least efficient bank has a score 0.

Table-3: Ranking of Pakistani Banks Based on their Mean Technical Efficiency Scores, 1976–1996

Banks/Years	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Average	Rank
1. National Bank of Pakistan	.79	.81	.89	.80	.89	.90	.89	.85	.89	.89	.88	.87	.89	.89	.91	.90	.92	.92	.91	.90	.89	.88	1
2. Muslim Bank	.87	.89	.85	.82	.85	.85	.86	.85	.85	.84	.87	.86	.85	.86	.89	.88	.89	.90	.91	.92	.84	.87	2
3. Habib Bank	.77	.86	.85	.78	.86	.88	.86	.81	.86	.85	.85	.86	.87	.88	.89	.90	.82	.85	.86	.87	.88	.86	3
4. Allied Bank of Pakistan	.86	.83	.82	.81	.87	.88	.89	.87	.85	.86	.85	.84	.85	.89	.90	.89	.88	.87	.85	.86	.88	.86	4
5. Federal Bank for Co-operatives	.82	.85	.84	.79	.88	.87	.85	.85	.85	.89	.89	.85	.86	.88	.87	.89	.90	.85	.86	.84	.87	.85	5
6. United Bank	.78	.82	.79	.79	.89	.89	.87	.82	.85	.86	.85	.87	.86	.89	.88	.85	.84	.86	.86	.87	.88	.85	6
7. Industrial Development Bank of Pakistan	.90	.89	.88	.85	.80	.82	.81	.83	.84	.85	.86	.84	.82	.87	.88	.89	.80	.86	.89	.88	.87	.85	7
8. Agricultural Development Bank of Pakistan	.82	.84	.83	.75	.79	.80	.85	.84	.89	.88	.90	.80	.85	.86	.84	.89	.88	.86	.85	.86	.87	.83	8
9. Punjab Provincial Co-operative Bank	.85	.87	.87	.78	.79	.80	.82	.85	.84	.86	.87	.85	.86	.87	.89	.90	.92	.85	.85	.84	.82	.82	9
Average	.83	.85	.85	.80	.83	.85	.86	.84	.86	.86	.87	.85	.86	.88	.88	.89	.87	.88	.88	.88	.89	.85	

Note: To obtain the percentage (%) efficiency, the efficiency scores were transformed by $1/1 + \mu_2$. In this transformation the most efficient bank has a score close to 1 and the least efficient has a score close to 0.

Table-4: Ranking of Foreign Banks Based on their Mean Technical Efficiency Scores, 1976-1996

Banks /Years	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Average	Rank
1. Deutsche Bank	.94	.95	.95	.96	.97	.99	.97	.99	.98	.97	.96	.97	.98	.98	.98	.99	.97	.96	.97	.96	.95	.972	1
2. American Bank	.97	.96	.95	.96	.99	.92	.94	.96	.96	.94	.93	.94	.99	.92	.93	.94	.96	.97	.99	.89	.88	.956	2
3. African Bank	.98	.97	.95	.96	.96	.97	.85	.87	.99	.94	.96	.97	.92	.95	.96	.97	.99	.99	.98	.95	.99	.955	3
4. Bank of Tokyo	.98	.98	.98	.98	.98	.98	.98	.98	.98	.98	.98	.98	.98	.98	.96	.94	.87	.88	.88	.86	.86	.954	4
5. Bank of India	.96	.97	.95	.95	.94	.93	.93	.94	.94	.94	.95	.94	.93	.92	.91	.92	.91	.94	.93	.92	.94	.935	5
6. Standard Chartered Bank	.93	.93	.94	.92	.94	.92	.94	.95	.94	.92	.91	.92	.96	.94	.94	.94	.93	.93	.93	.92	.92	.934	6
7. Algemene Bank of Netherland	.95	.96	.95	.96	.96	.95	.94	.97	.96	.98	.94	.97	.53	.92	.82	.81	.89	.91	.99	.95	.96	.922	7
8. Rupali Bank	.89	.88	.87	.86	.89	.90	.91	.89	.86	.88	.91	.88	.86	.88	.95	.92	.95	.96	.96	.96	.92	.903	8
9. American National Trust and Saving Association	.98	.97	.96	.80	.70	.89	.81	.69	.75	.82	.75	.80	.75	.89	.82	.81	.75	.69	.71	.72	.75	.802	9
Average	.95	.95	.94	.93	.92	.94	.92	.91	.93	.93	.92	.93	.88	.93	.92	.91	.91	.91	.93	.90	.91	.92	

Note: To obtain the percentage (%) efficiency, the efficiency scores were transformed by $1/1 + \mu_2$. In this transformation the most efficient bank has a score close to 1 and the least efficient has a score close to 0.

Given the difference in the nature of management practices of Pakistani and foreign banks, as discussed above, we construct separate cost frontiers for these two sub-samples and compare relative technical efficiencies of commercial banks in their respective samples. The parameters for the maximized log-likelihood functions for these two sub-samples are reported in Table-1 and discussed earlier.

In sum, commercial banks with foreign origin operate closer to their full efficiency potential than their Pakistani counterparts, which means that foreign banks are generally more cost-efficient than Pakistani banks.

5. Summary and Conclusion

This study was aimed at investigating empirically the technical efficiency of commercial banks operating in Pakistan and also aimed at making efficiency comparisons between the domestic and foreign banks. We have employed the parametric technique to shed light on the cost structure of banks and their nature and extent of cost inefficiency. We have derived efficiency scores by implementing a parametric translog stochastic cost frontier assuming half-normal distribution on a balanced panel data of 18 banks from 1976 to 1996 operating in Pakistan. We used the maximum likelihood estimating procedure to estimate the parameters of our models. The maximum likelihood parameter estimates for the translog cost frontier for the year 1976-1996 indicate a shift in respective cost structures of banks overtime. Our results showed that technological change occurred over time for the Pakistani banks as well as the foreign banks.

Our results indicate that the domestic banks operating in Pakistan are relatively less efficient than their foreign counterparts. This finding seems to be robust since similar ranking of included banks was obtained in all the three samples estimated in this study.

On the basis of mean efficiencies, we have found the average efficiencies and then ranked them. Ranking of the average efficiencies provides us a true picture of highly efficient banks and lowest level of efficiency of the banks. Ranking for the full sample indicates that the Deutsche Bank is relatively the most efficient bank, while the Punjab Provincial Bank for Co-operatives was about 18 % inefficient per annum as compared with its full potential, and thus regarded as the least efficient bank.

Separate mean efficiency scores were also estimated for the least and most efficient banks within their own sample. The Deutsche Bank is found

to be most efficient having 97% efficiency level and is ranked at number 1, while the American National Trust and Saving Association is least efficient and is ranked at number 9. Similarly, the ranking of Pakistani banks reflects that the National Bank of Pakistan is relatively most efficient among the 9 Pakistani banks. While Punjab Provincial Bank for Co-operatives is found to be the least efficient.

An interesting finding of this study is that when we constructed the best practice efficiency frontier of Pakistani banks, the best and worst performers are not very far apart on that frontier. In other words, all Pakistani commercial banks need to improve their respective cost efficiencies to bring them at an overall higher level. The best performers do have a little edge over others, but even their performance is far from satisfactory.

The foreign banks appear to be less constrained than the Pakistani banks [Klien 1992]. The present system seems to waste resources by diverging from efficient allocation choices, and frequently allows resources to flow more easily in line with political priorities.

The government as owner of the banks, underwrites the resulting costs. It is felt that a more transparent market based system is needed which will improve intermediation efficiency, reduce rent seeking activities, which helps in increasing the overall cost efficiency of banks without any political interference. Strong auditing requirements and full disclosure rules for banks and other financial institutions will also be helpful in increasing the overall efficiency of banks without any political interference [Klien 1992].

Banking reforms, which have started yielding positive results, should be continued to consolidate the past gains and to further improve the efficiency of commercial banks.

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Impact of Macroeconomic Announcements on the Stock Prices: An Empirical Study on the Turkish Financial Services Sector

Mete Feridun[*]

Abstract

The purpose of this study is to test the efficiency of the Turkish Markets in terms of the monthly inflation announcement effect. The study examines the reaction of the financial services sector to monthly inflation announcements, particularly, in case of unexpectedly low or high levels of inflation. Strong evidence emerges that the Turkish financial services sector does not react significantly to the announcements that are in line with the expectations. In other words, the cumulative abnormal returns around such inflation announcements are not significantly different from 0. The results of the robustness tests for no news, indicate that the t-statistics calculated by means of the Moving Average Approach are insignificant for the sector, which is in line with the results of the original approach. The results of the two robustness tests are found to be supporting the original findings of the adaptive approach.

Keywords: Abnormal Returns (ARs), Cumulative Abnormal Returns (CARs), effects of macroeconomic announcements

I. Introduction

In Turkey, high and fluctuating inflation has been one of the key features of the economy for almost 30 years. Among the major causes of inflation are persistent public sector deficits, high input prices due to rapid depreciation of the Turkish Lira (TL) and persistent inflationary expectations of economic agents (Dibooglu and Kibritcioglu, 2001: 2). Many programs based their anticipations on inflationary trends. Turkish inflation grew from single digit levels in the 1960s and reached its first peak in 1980 at more than 80% as shown in Figure 1. After reaching a second peak of 125% in

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[*] Lecturer in Economics, Faculty of Economics and Administrative Sciences, Cyprus International University, Nicosia, Cyprus. e-mail: mete.feridun@lycos.com

1994, inflation started a downward trend in response to a series of stabilization measures that were introduced in the same year. Throughout the second half of the 1990s, inflation continued to fluctuate within a 70 to 100% range. However, after the introduction of the 1999 Disinflation and Fiscal Adjustment Program and the three-year stand-by agreement signed with the International Monetary Fund (IMF), inflation dropped significantly. Under the three-year stand-by arrangement, the year-end inflation was targeted at 25% in 2000 and 10-12% by the end of 2001. A combination of internal and external factors starting in the late 1970s was responsible for Turkey's record of high inflation. Throughout the 1960s and the 1970s, Turkey followed an inward-looking growth strategy driven by import substitution policies.

Figure-1: Inflation (Consumer Price Index)
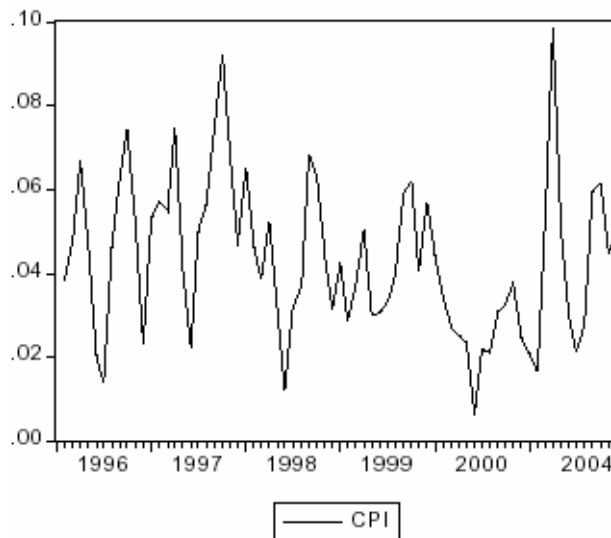
During the earlier stages of this strategy, inflation was relatively low and the expansionary effects of macro policies were moderate. The public sector, which was the driving force behind the growth strategy, relied heavily on domestic savings and foreign exchange receipts to meet borrowing requirements. However, as public sector borrowing requirements reached unmanageable levels due to excessive spending during the 1973-74 oil crisis, Turkey resorted to external borrowing and intensified its aggressive short-term borrowing practices. A balance of payments crisis followed and led to the debt crisis of 1978. Rising monetary aggregates exacerbated the inflation situation; that, and supply limitations resulting from shortages of imported inputs, caused inflation to accelerate

significantly toward the end of the 1970s. In 1980, Turkey introduced drastic measures to stabilize the economy, encourage export promotion, and gradually remove trade barriers and foreign exchange restrictions. The main goals of these measures were to lower inflation from the peak of more than 80%, improve the balance of payments, and through further restructuring transform Turkey into an outward looking export driven economy. Inflation initially fell to 30% in 1981, but gradually then began to rise and fluctuate within a 40 to 70 percent range during the rest of the 1980s.

Starting in 1988, Turkey began to follow populist measures that caused inflation to accelerate in the following years. As a result of excessive spending, rapid expansion of public sector credits, and expansionary monetary policies motivated by local and general elections, inflation rose significantly in the 1990s. Inflation reached its all time high of 125% in 1994, and Turkey experienced a severe financial crisis. In response to the rising inflation and the widening budget deficits, the government tried to keep interest rates low and switched from domestic borrowing to foreign debt and monetization. This policy, which was intended to reduce inflation without giving up economic growth, led instead to higher interest rates, higher deficits, and continued high inflation. The austerity plan introduced in 1994 did eventually succeed in bringing inflation down temporarily, but did not eliminate the macroeconomic imbalances. The year-end inflation, after surging to 125%, declined to 72% in 1995 but rose to almost 100% again by 1997. Efforts to reduce the interest burden on the budget continued, but that did not prevent the noninterest expenditures from rising. Thus, one primary source of inflation, excessive spending and the resulting budget deficits, remained in effect, and inflation continued to dominate Turkey's macroeconomic environment in the later 1990s. This article aims at examining the impact of inflation announcements on the performance of the financial services sector in Turkey through an event study methodology.

The article is organized as follows. The next section will provide a brief review of the literature. Section III will introduce the data and explain the methodology used. Section IV will present the results. The last section will point out the conclusions that emerge from the study.

II. Literature Review

There exists a rich literature on the relationship between stock prices and economic announcements. Bodie (1976), Nelson (1976), Fama and Schwert (1977), Feldstein (1980), Fama (1981), Schwert (1981), Geske & Roll (1983), Kaul (1987), and Pearce & Roley (1988) find a significant negative

relationship between inflation announcements and stock market returns in the United States. McQueen and Roley (1993) examine the relationship between stock prices and fundamental macroeconomic news. They investigate whether the response of stock prices to macroeconomic news varied over different stages of the business cycle and find out that the stock market's response to macroeconomic news depends on the state of the economy.

Connolly and Wang (1998) investigate the role of macroeconomic news announcements in explaining return and volatility spillovers between the US, UK, and Japan Stock Markets. Their results suggest that macroeconomic news announcements play a more important role in explaining volatility between stock markets than in explaining their return linkage. Pearce and Roley (1985) studied the daily stock market returns in terms of their reaction to announcements of the money supply, inflation, real economic activity, and the discount rate. Their findings indicate that money announcement surprises have a significant negative effect on stock prices, whereas the inflation and real economic activity surprises do not have a significant effect on stock prices. A thorough literature review is beyond the scope of this study. Interested readers may refer to Connolly and Wang (1998) for an extensive review of the literature.

III. Data and Methodology

In Turkey, inflation values for a specific month are announced in the following month by the State Institute of Statistics. The data for the announcement dates and inflation values are compiled from the Institute's website whereas the daily financial services sector indices are obtained from DataStream. The event window is set as 7 working days before and after the inflation announcement, and the event day is the first trading day after the announcement. The research is conducted over 1994:3 – 2003:5, and includes 112 announcements. As the first step of the calculations, the daily compounded returns are computed by means of the formulae (1) and (2) as shown below.

$$r_{i,t} = \ln\left[\frac{i, t+1}{P_{i,t}}\right] \tag{1}$$

$$r_{m,t} = \ln\left[\frac{P_{m,t+1}}{P_{m,t}}\right] \tag{2}$$

Where $r_{i,t}$ = daily return of sector i (i = 1,...,27) on day t, $P_{i,t}$ = price index for sector i on day t, $r_{m,t}$ = daily return of total market on day t, and ln = natural logarithm.

Next, inflation announcements are categorized into one of the following three groups as positive news, negative news, and no news. When the realized monthly inflation is at least 20 % less than the expected inflation for the same month, the announcement for that specific month is categorized as positive news. When the realized monthly inflation is at least 20 % more than the expected inflation for the same month, that month's inflation announcement is considered to be negative news.

When the realized monthly inflation is centred around the expectation by 20 %, it is categorized as no news.

A model of expectations is needed to find the deviations of actual observations from the expected inflation values and to categorize each individual announcement into one of the three groups discussed above. In this paper, two different approaches are used to form the expected inflation values where one approach serves as a robustness test for the other. In the first approach, adaptive approach, the realized inflation rate for any specific month is assumed to be the expectation for the following month. In other words, the expectation for any given month is the realized inflation rate for the immediate past month. Since the first announcement is used as the expectation for the second one, only 111 months remain to analyse the inflation announcement effect in this approach. Of the 111 announcements, 39 are categorized in good news, 33 turn out to be bad news and 39 are in line with the expectations (no news) in terms of the criteria discussed above. In the second approach, moving average expectations approach, the inflation expectation for any given month is assumed to be the average of the realized inflation values for the past 12 months in rolling windows. As the first 12 months are used to form the first expectation, only 100 months remain to examine the inflation announcement effect. Of the remaining 100 announcements, 39 turn out to be good news, 22 are categorized into bad news, and 39 are in line with the expectations (no news). As the first step of the event study, the daily Abnormal Returns (AR) are calculated using the following formula:

$$AR_{i,t} = r_{i,t} - r_{m,t} \tag{3}$$

Where $r_{i,t}$ = daily return of sector i (i = 1,...,27) on day t, $r_{m,t}$ = daily return of total market on day t and t= -7 ... +7. The next step is to

calculate the Cumulative Abnormal Returns (CAR) for each day ranging from (Day −7) to (Day + 7). The formula to calculate the CAR for time t is given below:

$$CAR_t = \sum_{t=-7}^{t} AR_t \qquad (4)$$

After calculating the ARs and CARs for the days in the event window for each announcement in the research period, average ARs and CARs for each category for each day in the event window are calculated. Formulae used to calculate Average AR and CAR values are given in Table-1 and Table-2 below.

Table-1: Calculation of Abnormal Returns (ARs)

	Adaptive Approach	Moving Average Approach
Good News	$\overline{AR}_{i,t,GN} = \dfrac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$	$\overline{AR}_{i,t,GN} = \dfrac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$
Bad News	$\overline{AR}_{i,t,BN} = \dfrac{\sum_{n=1}^{33} AR_{i,t,GN_n}}{33}$	$\overline{AR}_{i,t,BN} = \dfrac{\sum_{n=1}^{22} AR_{i,t,GN_n}}{22}$
No News	$\overline{AR}_{i,t,NN} = \dfrac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$	$\overline{AR}_{i,t,NN} = \dfrac{\sum_{n=1}^{39} AR_{i,t,GN_n}}{39}$

Table-2: Cumulative Abnormal Returns (CARs)

	Adaptive Approach	Moving Average approach
Good News	$\overline{CAR}_{i,t,GN} = \dfrac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$	$\overline{CAR}_{i,t,GN} = \dfrac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$
Bad News	$\overline{CAR}_{i,t,BN} = \dfrac{\sum_{n=1}^{33} CAR_{i,t,GN_n}}{33}$	$\overline{CAR}_{i,t,BN} = \dfrac{\sum_{n=1}^{22} CAR_{i,t,GN_n}}{22}$
No News	$\overline{CAR}_{i,t,NN} = \dfrac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$	$\overline{CAR}_{i,t,NN} = \dfrac{\sum_{n=1}^{39} CAR_{i,t,GN_n}}{39}$

Where t= -7 to +7, i= 27 different sectors and n = number of news. There are 111 announcements in the adaptive approach (39 good news, 33 bad news, 39 no news) and 100 announcements in the moving average approach (39 good news, 22 bad news, 39 no news). CARs, on the other hand, are used to explain the impact of the announcement on the sector over the event window before and after the announcement. Next, the t-statistics for all days are calculated to test whether the average CARs are significantly different from 0 or not throughout the event window. The t statistics are calculated by the following formulae for all the average CAR values.

$$ t - \text{statistic (CAR)} \quad = \quad \frac{\overline{CAR}}{(\sigma / \sqrt{n})} \tag{5} $$

Where σ = the standard deviation of the time series.

As described earlier, the secondary method will be provided as a robustness check along with the nonparametric robustness test. The adaptive approach is chosen as the main model due to its flexibility. The first robustness check is the moving average method. The results of the two methods will be compared to see whether the results are consistent. As the second robustness check, a non-parametric test is employed. The sign-test, which will be used to check the consistency of the results of the parametric t-test, is one of the most commonly used parametric tests. It is based on the assumption that the cumulative abnormal returns are independent and the probability of observing a positive or negative abnormal return is equal. If the null hypothesis is that there is a positive abnormal return associated with a given event, the null hypothesis is $H0: p \leq 0,5$ and the alternative is $HA: p > 0,5$ where $p = Pr(CAR_i \geq 0)$. To calculate the test statistic, N+, the number of cases where the abnormal return is positive and the total number of cases, N are needed. Letting J be the test statistic, as N increases, $J = ((N+/N) - 0,5) \times N1/2/0,5 \sim N(0,1)$ (Campbell, Lo & MacKinlay, 1997). The null hypothesis is rejected for the Js that are greater than critical normal values.

IV. Results

Table-1 shows the Average Cumulative Abnormal Returns for the financial services sector throughout the event window. Although the average cumulative abnormal returns are around zero throughout the research period, the average returns in cases of different announcements show

different characteristics. At a first glance, the financial sectors seem to be positively affected by unexpectedly high inflation announcements. This verdict is empirically evaluated with respect to CARs. Although the cumulative abnormal returns for total financials are negative on 14 of the 15 days in the event window they are not significantly different from 0 according to the t-test. The cumulative abnormal return reaches its absolute maximum on day +2 with − 0,454 %.

When the results of the Moving Average Approach and the Sign Test are either in line with the findings of the Adaptive Approach or inconclusive, they are considered to support the findings of the adaptive approach as shown in Table-2. As a result of the t-test, the CARs for the financial services sector are insignificant, i.e. inconclusive. These findings are identical to that of the Adaptive Approach. J-statistics indicate that the CARs for the sector are not significantly different from 0 on any of the days in the event window. Results suggest that the financial services sector takes advantage of unexpectedly high inflation announcements, as the t-statistics on Days -1 to +7 are all significant. The cumulative abnormal returns on days -6 to -2 are also positive, although they are not significant. The CARs reach the maximum on Day 0 when it is 1,667%. As can be seen from Table 2, CARs for total financials increase dramatically before the announcement and stay rather stable afterwards. Next, we examine the results of the robustness tests for bad news. According to the t-statistics, the average CARs calculated using the Moving Average Approach are not significantly different from zero for the sector on any day in the event window. The sign test strongly supports the findings for the sector with J statistics significant from day -1. Hence, as a result of the two robustness checks, it is possible to conclude that the original findings of the adaptive approach are consistent.

The third kind of news, no news, is considered to be important in showing the sectors' ability to predict the nature of the announcements and their performance when the inflation announcements are in line with the expectations. Financial services sector does not react significantly to the announcements that are in line with the expectations. In other words, the cumulative abnormal returns around such inflation announcements are not significantly different from 0. When we review the results of the robustness tests for no news, we see that the t-statistics calculated by means of the Moving Average Approach are insignificant for the sector, which is in line with the results of the original approach. The results of the two robustness tests are found to be supporting the original findings of the adaptive approach as evident from Table-2.

V. Conclusions

When inflation rates are high, the government and the other agents in the economy have to offer a higher nominal interest rate in order to be able to borrow from the market, since lenders require an interest rate that is higher than the expected inflation. As inflation rates turn out to be more than expected, it might imply instability in the market and higher interest rates. Therefore, financial institutions might perform well under inflationary environments and they might be adversely affected by unexpectedly low inflation announcements. The reaction of financial sectors might be explained by high interest rates associated with government bonds in Turkey, allowing small institutions to operate without conducting their core facilities.

Table-1: Average CARs

Days	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
Good News	-0.064	-0.076	-0.401	-0.18	-0.38	-0.18	-0.162	-0.28	-0.426	-0.454	-0.209	-0.139	-0.109	0.271	-0.127
Bad News	-0.066	0.05	0.334	0.281	0.528	0.56	1.413	1.667	1.345	1.24	1.478	1.623	1.608	1.471	1.463
No News	-0.008	0.077	0.11	-0.17	-0.39	-0.52	-0.935	-0.95	-0.781	-0.846	-0.829	-0.913	-1.114	-0.921	-0.997

(*), (**), and (***) indicate significant statistics at 90 %, 95 %, and 99 % Confidence Intervals respectively.

Table-2: Statistical Results

DAYS	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7
J-Stats															
GOOD NEWS	-1.121	-0.801	-0.48	-0.16	-0.48	-0.16	-0.48	-0.16	-0.801	0.16	0.48	1.121	1.121	1.121	1.121
BAD NEWS	-0.174	-0.174	1.219	1.567	0.87	1.915*	3.307***	2.959***	1.915*	2.611***	2.959***	2.959***	3.307***	2.959***	2.959***
NO NEWS	-0,160	-0,480	0,160	0,161	0,162	0,163	0,164	-0,480	-0,160	-0,160	-0,801	-0,480	-1,121	-1,441	-0,801
T-Stats for CARs															
GOOD NEWS (AA)	-0.259	-0.221	-1.3	-0.4	-0.75	-0.28	-0.275	-0.45	-0.663	-0.63	-0.31	-0.211	-0.154	0.356	-0.144
BAD NEWS (AA)	-0.274	0.131	0.76	0.599	0.897	1	2.114**	2.297**	2.128**	1.8*	2.27**	2.243**	2.424**	2.129**	1.899*
NO NEWS (AA)	-0.038	0.189	0.234	-0.3	-0.54	-0.74	-1.32	-1.24	-0.977	-1.016	-0.864	-0.902	-1.056	-0.853	-0.901
GOOD NEWS (MA)	-0.933	-1.33	-0.911	-1.18	-1.19	-1.14	-1.146	-1.31	-1.45	-1.239	-1.195	-1.458	-1.781	-1.34	-1.366
BAD NEWS (MA)	-0.563	-0.241	0.483	0.18	0.08	0.18	0.104	0.707	0.818	0.591	1.171	1.268	1.385	1.201	1.242
NO NEWS (MA)	1.615	0.962	0.406	0.495	0.06	0.58	0.709	1.105	0.798	0.626	0.555	0.954	1.321	1.302	1.13

(*), (**), and (***) indicate significant statistics at 90 %, 95 %, and 99 % Confidence Intervals respectively.
AA and MA stands for Adaptive Approach and Moving Average

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The Exchange Rates and Monetary Dynamics in Pakistan: An Autoregressive Distributed Lag (ARDL) Approach

Muhammad Arshad Khan[*] & Muhammad Zabir Sajjid[**]

Abstract

In this paper we investigate both the long and short-run relationship between real money balances, real income, inflation rate, foreign interest rate and real effective exchange rate with reference to Pakistan over the period 1982Q2-2002Q4 using ARDL approach which is a newly developed econometric technique. The estimated results indicate that in the long-run real income, inflation rate, foreign interest rate and real effective exchange rate have a significant impact on real money balances in Pakistan. The dynamics of real money demand show that the effects of rate of inflation, foreign interest rate and the real effective exchange rate are much smaller in the short run than long run. The results also reveal that the demand for real money balances in Pakistan is stable, despite the economic reforms pursued by the government since the late 1980s.

1. Introduction

In the pursuit of a meaningful monetary policy, understanding the demand for money plays an important role. The analysis of money demand helps policy makers to forecast money demand and determine the optimum growth rate of money supply, which is crucial in the control of the rate of inflation. The identification of money demand is equally important as it plays a crucial role in the transmission mechanism of both monetary and fiscal policy. The demand for money balances is an essential ingredient in most traditional macroeconomic models. The stability of money demand function is vital to the performance of monetary policies, since it enables the money supply to have a specific predictable impact on real variables. The stability of money demand function may be affected by the structural changes in the economy and as a result the monetary targeting would become ineffective. In Pakistan several reforms have been carried out since the late 1980s to get rid of the imminent

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[*] Associate Professor, Government Post-graduate College, Muzaffarabad (Azad Kashmir)
[**] Assistant Professor, Government Post-graduate College, Muzaffarabad (Azad Kashmir)

budgetary and balance of payments problems. These financial reforms have significantly changed Pakistan's financial system. The removal of foreign exchange controls and deregulation of financial markets have substantially changed the environment in which monetary policy operates. Government securities and inter bank markets have developed and deepened, interest rates are determined freely, and new indirect monetary controls have been developed. The impacts of subsequent reforms on financial sectors, foreign trade and commerce have not been examined within the context of Pakistan so far. This paper shows how inspite of financial liberalization and subsequent "boom and bust" of "bubbles" in the economy, a stable money demand function can be obtained by adopting an adequate econometric modeling strategy.

With the advent of the floating exchange rate since 1973, the literature has stressed the importance of including exchange rates and foreign interest rates as determinants of money demand for developed and developing countries. Tower (1975); Arango and Nadiri (1979, 1981), Arize (1989), McNown and Wallace (1992), Bahmani-Oskooee and Rhree (1994), Bahmani-Oskooee (1996) and Bahmani-Oskooee and Techaratanachai (2001) have shown the existence of a relationship between money demand and exchange rates. Similarly, Arango and Nadiri (1981) and Booth and Chawdhury (1992) have stressed the importance of foreign interest rates as a determinant of money demand because of its effects on the desired stock of real cash balances and exchange rate expectations. Few empirical studies have investigated the impact of the exchange rate on the demand for money in LDCs, and the results have been mixed.

Lee and Chung (1995) find that the exchange rate exerts negative and statistically significant effects on Korea's demand for money. Tan (1997) considers the demand for money in Malaysia and reports that the exchange rate has a statistically significant effect on real M_1 balances and no effect on real M_2 balances. Ibrahim (2001) re-examines Malaysian money demand and finds that the exchange rate has a negative effect on both real M_1 and real M_2 balances. Weliwata and Ekanayake (1998) study Sri Lanka's demand for money and find that the exchange rate has a significant negative effect on real M_1 balances. They fail to obtain a meaningful M_2 relation. Money demand for a developing economy like Pakistan has been largely ignored. This paper tries to fill this gap.

The objective of this paper is to estimate money demand function for Pakistan by keeping in mind the recent developments in the money demand literature, which incorporates real exchange rates and foreign interest rates as additional arguments of the money demand function. For estimation purposes, we utilize quarterly data over the period 1982Q1

through 2002Q4 and the estimation technique will be Autoregressive Distributed Lag (ARDL) developed by Pesaran *et al* (2001).

The rest of the paper is organized as follows: section 2 presents the model specification. Data and econometric methodology are discussed in section 3. Empirical findings are presented in section 4, while concluding remarks along with some policy implications are given in the final section.

2. Model Specification and Economic Theory

In economic theories of money demand, money is determined for at least two reasons[1]. The *first* is as an inventory to smooth differences between income and expenditure streams, and the *second*, is as one among several assets in a portfolio. Both demands lead to a log-linear specification such as:

$$(m - p)_t \quad = \quad \beta_0 + \beta_1 y_t + \beta_2 i_t + \beta_3 \pi_t + \mu_t \tag{1}$$

Where m is logarithm of nominal money balances, p is the logarithm of price level, y is the logarithm of real GDP, i is the interest rate variable, π is the inflation rate and μ is the error term.

According to equation (1), real money balances are assumed to be an increasing function of real income, that is, β_1 is expected to be positive. The opportunity cost of holding money relative to financial assets (i_t) is expected to yield a negative influence on money demand, so β_2 is expected to be negative. The opportunity cost of holding money (i.e. inflation rate) relative to real value of physical assets exerted negative effects on money demand, hence β_3 is expected to be negative. An increase in expected inflation should lead to substitution away from money to real assets.

The above framework may be appropriate for the closed economy, it is unlikely to be adequate for developing economies because foreign sector consideration plays a key role in the determination of their money demand function. Therefore, given the openness of these economies, including Pakistan, an appropriately specified money demand model should take account of foreign monetary developments, such as variation in exchange rates and foreign interest rate (Arango and Nadiri, 1981). The link between exchange rates and money demand can also be used to define currency substitution. The currency substitution literature suggests that portfolio shifts between domestic and foreign money provide a role for a foreign exchange variable (Agenor and Khan, 1996)[2]. In contrast, the capital

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[1] See for example Ericsson and Sharma (1996)

[2] Mundell (1963) argued that the demand for money is likely to depend upon the exchange rate, in addition to the interest rate and the level of income. A portfolio model

mobility literature focuses on the foreign interest rate variable (Ambler and McKinnon, 1985 and McKinnon, 1983).

Given the above background, the demand for real money balances in equation (1) is augmented with the real effective exchange rate (q_t) and foreign interest rate (i_t^*), that is:

$$(m-p)_t \quad = \quad \beta_0 + \beta_1 y_t + \beta_2 i_t + \beta_3 \pi_t + \beta_4 i_t^* + \beta_5 q_t + \mu_t \qquad (2)$$

An increase in the foreign interest rate (i_t^*) may raise the attractiveness of foreign bonds and induce domestic residents to transfer their financial assets to the high-yielding capital markets. Such a transfer will be financed by drawing down domestic money holdings[3]. Therefore, it can be postulated that an increase in the foreign interest rates will have a negative impact on the money demand, so β_4 is expected to be negative.

Arango and Nadiri (1981) have argued that a depreciation of the domestic currency increases the value of foreign securities held by the domestic residents. If this increase is perceived by the domestic security holders as an increase in their wealth, their demand for domestic cash balances may increase. Thus an increase in the real exchange rate (i.e. depreciation of Pak-rupee) is likely to increase the demand for money. In this case β_5 is expected to be positive. On the other hand, when the exchange rate depreciates for a net debtor country (as in Pakistan), the home currency value of wealth falls and this reduces the demand for money; hence the estimate of β_5 should be negative.

To summarize the expected signs for equation (2) are $\beta_1 > 0$, $\beta_2, \beta_3, \beta_4 < 0$ and $\beta_5 > < 0$. Based on the above discussion, an increase in the real exchange rate (i.e. depreciation of Pak-rupee) could have a positive or negative effect on the demand for real money balances; therefore, which effect dominates is an empirical issue.

3. Data and Econometric Methodology

The present study is based on quarterly data covering the period from 1982Q2 through 2002Q4, which include the 1990s reforms period as well. M is the broad money, which includes all Pak-rupee denominated currency in

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of the financial market explored by Arango and Nadiri (19981) provides a role of the exchange rate variable in the money demand function. However, they pointed out that the effect of the exchange rate is more difficult to sign.

[3] This is called capital mobility effect.

circulation plus demand, time and foreign currency deposits. P is the price level proxied by the (CPI) Consumer Price Index (2000=100). Y is the real GDP. Since the quarterly series on GDP are not available we generated quarterly series for GDP following Goldstein and Khan (1978). i is the interest rate variable proxied by the money market rate. π is the inflation rate variable, which is calculated by taking the log-difference of CPI. i^* is the foreign interest rate proxied by the US Federal Fund Rate, while q is the trade weighted real effective exchange rate index composed by the IMF as a proxy for the exchange rate. All the data are taken from IFS CD-ROM. Since the estimated coefficient of the domestic interest rate is statistically insignificant hence in the empirical specification this variable is excluded from the analysis.

Since our intention is to detect the long run relationship between real money balances, real GDP, inflation rate, foreign interest rate and real effective exchange rate, the appropriate technique to be used is error correction modeling and cointegration analysis. In applying any cointegration technique, the first exercise is to determine the degree of integration of each variable in the model. This of course, will depend on which unit root test one can use. To avoid this difficulty and pre-testing of unit roots, Pesaran and Shin (1995) and Pesaran *et al* (1996, 2001) introduced a relatively new cointegration test — know as Autoregressive Distributed Lag (ARDL) approach. This test has several advantages. One of its most notable features is that the existence of the long run relationship is tested without any *a priori* knowledge of the order of the time series (i.e. I(0) or I(1)) of the possibility of cointegration. Since the power of existing unit root tests to identify the order of integration, in particular, whether I(0) or I(1) is always questionable, hence their test may be useful (Nagayasu, 1998). Another useful feature of this test is that it does not matter whether the explanatory variables are exogenous or not (Pesaran and Shin, 1997). The short-and long-run parameters with appropriate asymptotic inferences can be obtained by applying OLS to ARDL with an appropriate lag length. A general specification of this test can be expressed as:

$$\Delta rm_t = \alpha_0 + \alpha_1 t + \gamma rm_{t-1} + \delta x_{t-1} + \sum_{i=1}^{\rho} \theta_i \Delta rm_{t-i} + \sum_{i=1}^{\rho} \phi_i \Delta x_{t-i} + \varepsilon_t \qquad (3)$$

Where **rm** is the real money balances, t is the time trend and **x** is a vector of explanatory variables (.i.e. y_t, π_t, i_t^*, q_t). Testing the existence of a long-run relationship can be conducted by examining the joint null hypothesis that $\gamma = \delta = 0$ against the alternative that $\gamma \neq \delta \neq 0$ and therefore, this test resembles testing the existence of ECM after estimating the short-run dynamic specification. Existence of a long run relationship can be confirmed once this null is successfully rejected. A conventional

distribution cannot be applied in this context. Pesaran *et al* provide critical values based on their stochastic simulation. The fact that their test considers two extreme cases: I(0) and I(1), leads to calculation of the two extreme critical values, which create the critical value band[4]. Therefore, the null hypothesis can be rejected when calculated F-values are greater than the upper boundary and cannot be rejected when they are less than the lower ceiling. When the F-values are within the band, the result is inconclusive.

4. Empirical Results

We implemented Pesaran *et al* (1996, 2001) cointegration test outlined in equation (3) in order to estimate the demand for real money balances for Pakistan over the period 1982Q2-2002Q4. In the *first* step, we have estimated equation (3) by imposing two, four and six lags on each first differenced variable and calculated F-tests. But when two lags are imposed, there is strong evidence for cointegration because our calculated F-statistic is 6.6933, which is greater than the critical value of the upper level of the band (i.e. 3.83) at the 5 percent level of significance. This result gives an indication for the existence of a long-run relationship between real money balances, real income, inflation rate, foreign interest rate and the real effective exchange rate. However, cointegration disappeared when we shift to four or six lags.

Once the cointegration is established, we move to the second stage of the procedure which involves estimating the error correction model represented by equation (3) by keeping the lagged level of variables and by relying upon a criterion we selected the appropriate lag order on each of the first differenced terms. After normalizing on real money balances, we obtain estimated long run coefficients represented by Table-1.

Table-1: Estimated Long-run Coefficients of Real Money Balances Using ARDL Approach

Dependent Variable: $(m - p)_t$			
Regressor	**Coefficient**	**t-values**	**p-values**
y_t	1.00	23.74	0.000
π_t	-6.33	-2.94	0.004
i_t^*	-0.06	-3.20	0.002
q_t	0.23	2.25	0.030

Note: ARDL (1, 1, 0, 0, and 0) selected on the basis of AIC

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[4] This cointegration test can be implemented by means of an F-test. The two set of critical values are tabulated by Pesaran *et al* (2001).

As can be seen from Table 1, the estimates possessed expected signs and are statistically significant at the 5 percent level of significance. The coefficient of real income is significant and equal to unity, indicating that a 1 percent increase in real GDP will lead to an equi-proportional increase in real money balances. The negative coefficient of inflation rate will exert a negative impact on the real money holdings. This indicates that in Pakistan people prefer to substitute real assets for money balances. The foreign interest rate variable has produced a negative influence on domestic money. However, the effect of this variable is relatively small. The real effective exchange rate will exert a positive effect on domestic real money balances. This result implies that in the long run, a 10 percent increase in the real effective exchange rate will increase, on average, the demand for real money balances by 2.3 percent per quarter. This finding is consistent with the wealth enhancing effect. Since M_2 is a more investment-oriented definition of money, the positive effect of the exchange rate on real money balances may be justified. Since the wealth holders evaluate their asset portfolio in terms of the Pak-rupee, a depreciation raises the domestic currency value of foreign assets and those wealth holders who see this as an increase in their wealth may repatriate part of their foreign assets to domestic assets, including M_2, in an attempt to maintain a fixed share of their wealth invested in domestic currency.

Estimation of Short Run Dynamics

The error correction regression associated with the above long run relationship based on the ARDL approach is reported in Table 2. The estimated lagged error correction term (Ecm_{t-1}) is negative and highly significant. This result supports the cointegration among the variables. The coefficient of the feed back parameter is –0.1188, and suggests that, when real money balances exceed their long-run relationship with real income, inflation rate, foreign interest rate and real effective exchange rates, they adjust downwards at a rate of about 12 percent per quarter. This finding implies that: *first,* overlooking the cointegratedness of the variables would have introduced a misspecification in the underlying dynamic structure; *second,* there exist market forces in the monetary sector that operate to restore long-run equilibrium after a short-term adjustment; third, it takes a little above one year for 50 percent of the deviations from long-run equilibrium to be corrected.

Table-2: Error Correction Representation for Selected ARDL Model
Dependent Variable: $\Delta(m - p)_t$

Regressor	Coefficient	t-value	p-value
Δy_t	-0.2029	-0.9513	0.345
$\Delta \pi_t$	-0.7520	-3.5486	0.000
Δi_t^*	-0.0067	-4.8470	0.000
Δq_t	0.0277	3.1244	0.003
$Ecm_{(-1)}$	-0.1188	-3.3805	0.001
R^2	0.34	R^2_{adj}	0.30
S.E. of Regression	0.017	F(4,74)	9.5488 (0.000)
R.S.S	0.02	AIC	205.5814
LL	211.584	DW	2.2506

Note: ARDL (1, 1, 0, 0, and 0) selected on the basis of AIC. R.S.S, LL, AIC and DW are respectively residual sum of squares, log likelihood, Akike's Information Criteria and Durbin Watson Stat. Figures in brackets represents p-values and $Ecm=(m-p)_t-1.00y_t+6.33\,\pi_t+0.06\,i_t^*-0.23\,q_t$

From the empirical analysis, three points are worth mentioning. *First*, our results are not consistent with the hypothesis of an instantaneous adjustment of the growth of real money balances to departure from their equilibrium value in the previous period. *Second*, because M_2 contains a savings component, hence the speed of adjustment is slow. Cuthberston and Taylor (1990) argue that slow speed of adjustment is based on the resident's precautionary saving motive being influenced by the long-run considerations of future income and the rates of return. *Finally*, the response of real exchange rate depreciation is about 0.03 per quarter.

The results show that changes in real income is not statistically significant while changes in rate of inflation, foreign interest rate and real effective exchange rate have significant short-run effects. According to the results given in Table 3, the short-run elasticities of the inflation rate, foreign interest rate and real exchange rate are –0.75, -0.007 and 0.03 respectively. Further more these elasticities are much lower than the long-run elasticities.

Moreover, when the estimated values of $\Delta(m-p)_t$ are fitted against the actual values, it performs well in terms of tracking the cyclical nature of the movements in Pakistan, represented by Figure-1.

Figure-1

Plot of Actual and Fitted Values
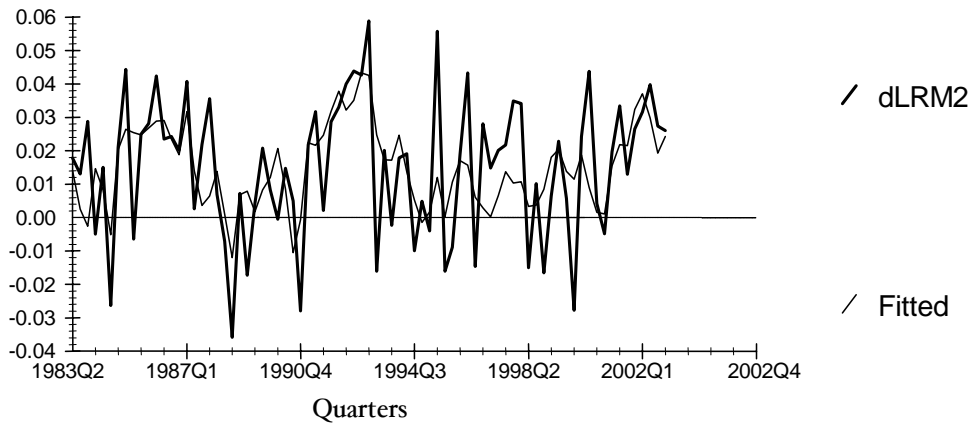
The estimated error correction model was found to be stable in terms of CUSUM of squares test. Figure 2 plots the CUSUM of squares of recursive residuals.

Figure-2

Plot of Cumulative Sum of Squares of Recursive Residuals
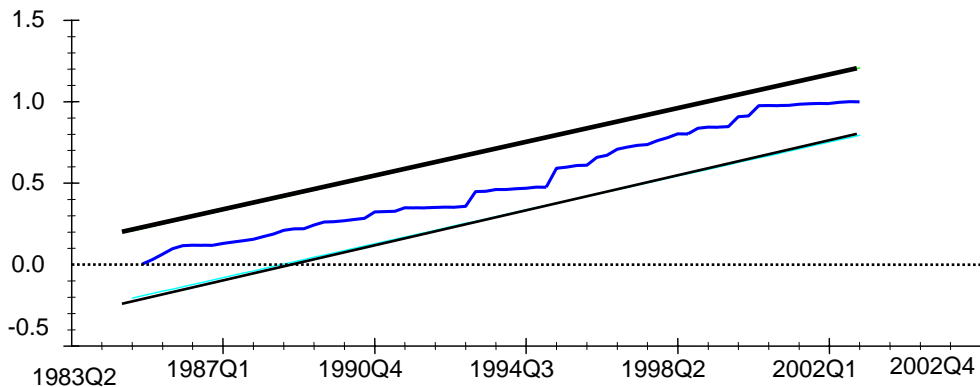
The straight lines represent critical bounds at 5% significance level

CUSUM of squares path lies within the bands, indicating no structural change at the 5 percent level.

5. Conclusions

In this study a newly developed econometric technique by means of ARDL has been used to investigate empirically the fundamental issue of whether a long-run equilibrium relationship exists between real money balances and their determinants in Pakistan over the period 1982Q2-2002Q4. The empirical results reveal that there is a stationary long run relationship between real money balances, real income, inflation rate, foreign interest rate and real effective exchange rate. The analysis indicates that in the long run income elasticity is equal to one, in accordance with the predictions of the quantity theory of money. The opportunity cost of holding money (i.e. inflation rate) exhibits the correct sign. Furthermore, real income and the rate of inflation are the two important determinants of domestic money holdings in Pakistan. This implies that domestic asset holders view the holding of physical assets as an attractive alternative to monetary assets because in the long run real assets substitution is strong both in the short as well as in the long run. Moreover, the response of the foreign interest rate is very low both in the short and long run. The impact of real effective exchange rate on real money balances is positive and significant in the long run. However, this impact is low in the short run. The error correction is negative and significant, indicating that about 12 percent adjustment towards long run equilibrium takes place in one quarter. Finally, the result also indicates that demand for real money balances in Pakistan remained stable throughout the period under investigation.

Important policy implications derived from the above findings are:

- The relative effectiveness of monetary and fiscal policies could be altered. For example, if an expansionary monetary policy is implemented in a situation where confidence in the domestic currency is lacking, its effectiveness may be compromised, leading to poor economic growth.

- The rebalancing effect resulting from variations in the real exchange rate play a key role in Pakistan's money demand behavior.

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Comparative Advantage and Competitiveness of Wheat Crop in Pakistan

Sofia Anwar, Zakir Hussain, M. Siddique Javed[*]

This study was conducted to analyze the comparative advantage and competitiveness of wheat crop and its implications for resource allocation towards competing crops. The extent of policy distortion and agricultural protection was also determined by the study. The data were collected from APCom on cost of production of wheat crop over the three year period (2001-2003). Two main provinces contributing towards wheat production i.e. Punjab and Sindh were selected as the sample. This data were then averaged to obtain a national scenario. The crop budgets were prepared initially in financial terms and later on economic prices were utilized to evaluate the comparative advantage and competitiveness of the wheat crop. The Policy Analysis Matrix (PAM) was selected as the analytical framework. The policy distortions were measured through Nominal Protection Coefficient (NPC) and Effective Protection Coefficient (EPC). The Domestic Resource Cost ratio (DRC) was selected as a measuring tool for comparative advantage. Keeping in view the importance of wheat in the economy, the analysis was conducted in two price regimes i.e. import and export parity prices. The analysis results showed that at import parity price Pakistan has a comparative advantage in the production of wheat only as an import substitution crop. At export parity price, Pakistan is not competitive in the world wheat market and has no comparative advantage in wheat production.

I. Introduction

Wheat is the staple food crop for Pakistan, dominating all crops in acreage and production. Wheat is sown on more than 8 million ha having a share of 37.1 percent of the total cropped area, 65 percent of area and 70 percent of the production of food grain crops. Wheat contributes 13.8 percent to the value added in agriculture and 3.4 percent to agricultural GDP and is mainly grown under irrigated conditions.

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[*] The authors respectively are graduate student, Former Dean, Faculty of Agricultural Economics and Rural Sociology, and Chairman, Department of Agricultural Economics, University of Agriculture, Faisalabad.

There was a bumper crop of wheat with a production level of 21.8 million tons in the year 1999-00. This shows the price responsiveness of Pakistani farmers as the support price of wheat was increased to Rs.300 per 40 kg (APCom, 2002). The growers increased the area and also provided good quality of seed, augmented doses of fertilizer and better management practices. In the consecutive three years from 2001 to 2003 production declined to 18-19 million tons.

Pakistan was a net importer of wheat during the last decade up to 1998-99. On an average, Pakistan spent US $ 352 million on the import of wheat from 1989-90 to 1999-00. Pakistan was graduated from net wheat importer to exporter due to a bumper harvest in the year 1999-00. But unfortunately, Pakistan produced wheat at a very high cost of about $ 150 per Mt against the border price of $ 130 per Mt. Thus, Pakistan could not fetch a ready market for export (GOP 2002-03). The domestic requirement of wheat is nearly 22 million tons. However, the continuous decline in production in the next three years forced the country to import one million tons of wheat (GOP 2003-04).

In view of its importance and implications of the Uruguay Round of Agreement on Agriculture (URAOA), it is imperative to assess economic efficiency and competitiveness of wheat crop production. It is further required for policy making to maintain a self-sufficient level of wheat and rational allocation of scarce resources in both at import and export parity.

The international competitiveness and effects of policy intervention stands out as most critical. The removal of market intervention desires change in the structure of economic incentives. This in turn will cause major adjustments in the pattern of production, allocation of resources and trade flows. It is therefore crucial for a country like Pakistan to exploit the comparative advantage in the production and trade of agricultural commodities (Hassan 1999).

The use of comparative advantages analysis deals not only with on-farm production but incorporates downstream collection, processing and wholesaling activities. It thus provides an analysis of an entire commodity chain (Slinger, 1997). In terms of international trade, comparative advantage refers to a comparative cost advantage in producing commodities and explains observed trade patterns according to country differences in resource endowments, investment patterns, technology, human capital and managerial expertise, infrastructure and government policies. The term competitiveness encompasses not only relative prices and the ability to

market but also quality differences, production and distribution costs, and production and distribution efficiency (War 1994).

The study of comparative advantage of the wheat crop is of great importance for Pakistan to know the current and future potential of wheat in international trade. Further to check the consistency of the current set of policies with the existing pattern of competitiveness.

Appleyard (1987) studied the comparative advantage in the agriculture sector in Pakistan. The results showed that Sindh has more comparative advantage in the production of wheat for the study period. Longmire and Debord (1993) indicated that comparative advantage prevailed in the production of wheat crop in Pakistan. Khan (2001) observed that Pakistan did have comparative advantage in wheat production for food self-sufficiency but not for export purposes at the current input-output price relationship. Akhtar (2004) showed that domestic wheat production is not economically competitive with imports. The wheat growers were disprotected by the state pricing, trade policy and market situations.

2. Material and Methods

The study was based on secondary data and the time series cost of production data were obtained from the Agriculture Price Commission (APCom); the policy organ of the Ministry of Food and Agriculture Stocks, Pakistan. The COP data were collected for three harvesting years i.e. 2000-01 to 2002-03 for the two provinces, Punjab and Sindh.

The Policy Analysis Matrix (PAM) was selected as the analytical framework. The Policy Analysis Matrix (PAM) is a computational framework developed by Monke and Pearson (1989) and augmented by Masters and Winter-Nelson (1995) for measuring input use efficiency in production, comparative advantage and the degree of government interventions (Nelson and Panggabean, 1991).

The PAM addresses three principal issues:

- The impact of policy on comparative advantage and farm level profits

- The influence of investment policy on economic efficiency and comparative advantage.

- The effects of agriculture research policy on changing technologies.

The PAM was designed in the study by incorporating revenues and costs, taken from private and social budgets of the wheat crop. To prepare the social budgets the parity prices of wheat and fertilizer were used. The tradable

inputs, for which the parity prices were not utilized, were weighted by the premium. The premium is the ratio of the shadow exchange rate (SER) to the official exchange rate (OER) and for the study period was estimated as 1.138. The data were then analyzed to assess competitiveness and comparative advantage at the production level. The measurement of comparative advantage and policy distortions in agriculture was developed through the approaches of Domestic Resource Cost (DRC), Nominal Protection Co-efficient (NPC) and Effective Protection Co-efficient (EPC). Many studies in the near past have utilized PAM to evaluate the comparative advantage and policy effects in Pakistan [Appleyard (1987) Longmire (1993)].

Pakistan was a regular importer of wheat up to 1999-00, annually importing 2 to 4 million tons. Therefore, estimation of import parity price of wheat is imperative. Pakistan had a bumper wheat crop in the year 1999-00 and provided a sizable exportable surplus. Pakistan exported nearly one million tons of wheat in 2001-02 for the first time. Thus, Pakistan has the potential to produce exportable surplus to earn foreign exchange. However, the country faced some difficulties in exporting wheat due to high production cost. Therefore it is imperative to analyze the competitiveness and comparative advantage in production of wheat in both import and export parity prices.

3. Empirical Estimates

3.1. Export Parity Price Analysis

The PAM results for Punjab highlight that the NPI was 0.89 and the NPC was 0.70 (Table-1). It showed that farmers were paying for inputs prices close to the border prices. The wheat crop was not provided any subsidy or support, rather was under priced. The EPC with a value of 0.62 indicated that the producer of wheat was not provided any type of protection. The DRC was 0.54 showing that Punjab has a strong comparative advantage in wheat production as an import substitution commodity (Table-1).

Table-1: Policy Analysis Matrix for Wheat in Punjab at Import Parity Price

	Revenue	Production costs		Profit		
		Tradable	Non-tradable		NPI=	0.89
Private prices	10388.33	4061.73	5350.63	975.98	NPC=	0.70
Social prices 1	14795.58	4588.69	5465.29	4741.60	EPC=	0.62
Divergence 1	-4407.25	-526.96	-114.67	-3765.62	DRC=	0.54

The results in Table-2 show that the NPI and NPC have the values of 0.87 and 0.89 respectively for Sindh and one can draw the same conclusions for the Punjab. The EPC has a value of 0.90 that supports the conclusion drawn through NPI and NPC. It explains that the wheat crop was not getting any protection neither in the input market nor in the output market. The DRC was 0.62, indicating a comparative advantage possessed by Sindh in wheat production at Export parity price.

Table-2: Policy Analysis Matrix for Wheat in Sindh at Import Parity Price

	Revenue	Production costs		Profit		
		Tradable	Non-tradable		NPI=	0.87
Private prices	9100.00	3196.21	3957.03	1946.77	NPC=	0.89
Social prices	10225.21	3657.90	4049.77	2517.54	EPC=	0.90
Divergence 1	-1125.21	-461.69	-92.75	-570.77	DRC=	0.62

At the national level the NPI has a value of 0.88 and NPC 0.79; explaining no support was provided on inputs. The EPC supported the results that the government was not providing any support to inputs and output during the study period. Wheat was under priced that discouraged the farmers to produce more wheat. The DRC 0.58 showed that Pakistan has a comparative advantage in wheat production as an import substitution crop.

Table-3: Policy Analysis Matrix for Wheat in Pakistan at Import Parity Price

	Revenue	Production costs		Profit		
		Tradable	Non-tradable		NPI=	0.88
Private prices	9766.04	3646.80	4661.81	1457.43	NPC=	0.79
Social prices	12404.90	4141.12	4765.52	3498.26	EPC=	0.74
Divergence	-2638.86	-494.32	-103.71	-2040.83	DRC=	0.58

3.2. Import Parity Price Analysis

The results of the Policy Analysis Matrix for wheat on export parity basis are given in Table-4. The NPI is 0.89 indicating a slight variation between domestic and foreign price of inputs. It means farmers are paying

nearly the world prices for tradable inputs and there was no government support and tax. The NPC has a value of 1.82 showing higher price in the local market than at the international level. The EPC value of 5.63 showed lack of competitiveness in wheat production at export parity prices. The DRC was 4.86 showing no comparative advantage in wheat production at export parity price. The analysis overall shows that Punjab has no competitiveness in the world wheat market at import parity price.

Table-4: Policy Analysis Matrix for Wheat in Punjab at Export Parity Price

	Revenue	Production costs		Profit		
		Tradable	Non-tradable		NPI=	0.89
Private prices	10388.333	4061.731	5350.626	975.976	NPC=	1.82
Social prices	5712.703	4588.691	5465.295	-4341.283	EPC=	5.63
Divergence	4675.631	-526.960	-114.669	5317.259	DRC=	4.86

The results of PAM for Sindh are given in Table-5. The NPI for Sindh was 0.87 expressing that farmers were paying nearly world prices for tradable inputs. During the study period there was no subsidy and no tax on inputs. The NPC has a value of 1.91 indicating farmers were getting higher prices as compared to international prices. The provincial government was providing subsidy in the form of transportation cost and other incidentals. The EPC value was 5.33 showing no economic advantage and reinforced the inferences drawn by NPI and NPC. The DRC was 3.65 depicting Sindh has no comparative advantage in wheat production at import parity price.

Table-5: Policy Analysis Matrix for Wheat in Sindh at Export Parity Price

	Revenue	Production costs		Profit		
		Tradable	Non-tradable		NPI=	0.87
Private prices	9100.000	3196.206	3957.027	1946.767	NPC=	1.91
Social prices	4766.141	3657.898	4049.774	-2941.531	EPC=	5.33
Divergence	4333.859	-461.692	-92.747	4888.298	DRC=	3.65

The Policy Analysis Matrix obtained in Table-6 shows that Pakistan has no competitiveness in wheat production at export parity prices. The NPI

is 0.88 showing small protection to wheat producers in input use and farmers were paying close to border prices for their inputs. Small protection was given in the form of indirect subsidy to irrigation water. The NPC was 1.86 indicative of higher output price of wheat in the local market as compared to the border price. The EPC ratio of 5.57 supported the earlier conclusion through NPI and NPC. The DRC was 4.34 showing absolutely no comparative advantage in wheat production at the import price. This explains the dilemma of wheat export in the previous years. Pakistan has to export wheat at a much lower price than the production cost. Wheat is the staple food and important food security crop, so the government does procure at the national support price and also the provincial government provides subsidized transport and incidental cost to provide wheat at an affordable price to the consumer especially in the urban areas. The Pakistani farmer is producing wheat at a very high cost, thus he cannot compete in the international market.

Table-6: Policy Analysis Matrix for wheat in Pakistan at Export Parity Price

	Revenue	Production costs		Profit		
		Tradable	Non-tradable		NPI=	0.88
Private prices	9766.042	3646.800	4661.812	1457.430	NPC=	1.86
Social prices 1	5239.422	4141.120	4765.519	-3667.217	EPC=	5.57
Divergence 1	4526.620	-494.320	-103.707	5124.647	DRC=	4.34

Conclusions:

The study was carried out to find the comparative advantage and competitiveness of the wheat crop both at the export and import level. The Policy Analysis Matrix (PAM) was selected as the analytical framework. The crop budgets were developed on the basis of financial and economic prices in two major provinces, Punjab and Sindh and then for Pakistan. It was concluded that during the study period Pakistan has no comparative advantage in the production of wheat at the export parity price thus has lost its competitiveness in the open market. The cost of production of wheat is much higher in the country that makes the Pakistani farmer unable to compete in the world market. In addition to this high transportation charges and poor quality of wheat also increased the marketing costs. On import parity price Pakistan has a comparative advantage in producing wheat as an import substitution crop.

Recommendations

1. The country should reap the comparative advantage of the wheat crop by reducing the input cost and or increase the productivity of the crop.

2. The cost of production of the wheat crop must be reduced either by using cost saving technology or by increasing the productivity of the crop through high yielding varieties and better management practices.

3. The input delivery system is not efficient; therefore black marketing, under bagging, sale of adulterated chemicals, poor quality and off type seed and substandard fertilizers require strict monitoring.

4. The total productivity of the crop depends heavily on seed quality along with other factors. The provision of various seeds must be ensured from seed companies, dealers.

5. The market imperfections must be removed through marketing efficiency and institutionalization of market intelligence.

6. The value added per acre-inch of water shows the criticality of this vital input. The present flat rate system is allocativly neutral leading to misallocation of this scarce resource. Therefore the water pricing of this input is imperative for its rational allocation.

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Corruption and Trade Liberalization: Has the World Bank Anti-Corruption Initiative Worked?[1]

Azam Chaudhry[*]

I. Introduction

In September 1997, the World Bank formally began its anti-corruption initiatives by adopting a series of official guidelines and policy statements to aid in anti-corruption strategies. One of the main areas of focus is international trade. According to World Bank (1997), the areas in which corruption is most often found is in, "customs and tax departments, social security agencies, land titling and environment agencies administering regulations and issuing licenses, public works departments and other agencies involved in significant public procurement, police and judiciary, and privatization agencies." In particular, trade policies can be susceptible to corruption, even though many countries have successfully managed trade policies to promote industrialization. This susceptibility of trade policies to corruption is because they involve allocations made by the authorities on discretionary rather than efficiency bases. Examples of this are the discretionary actions of customs officials, the administrative actions of the authorities in the allocation of import licenses and foreign exchange, and bribery involved in maintaining high rates of tariffs.

Despite this obvious link, there has been some debate about the nature of the corruption-international trade relationship. One strand of thought has analyzed the effects of corruption on international trade. Lambsdorff (1998) and Anderson and Marcouiller (1999) describe how corruption reduces international trade, because importers and exporters are discouraged by a system of bribery, uncompetitive bidding, selective taxation and artificially created monopolies. The implicit assumption is that the chain of causality runs from corruption to trade, i.e., to increase international trade, one must reduce the level of corruption. The second

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strain of thought reverses the chain of causality. Thus Ades and di Tella (1995, 1996, 1997) claims that it is the level of international trade that is one factor (of the many factors) that affects the level of corruption. The argument is that trade liberalization, which results both in the enlarging of the scope and increasing the efficiency of the market, should make markets more competitive. This reduces the level of available rents, which in turn leads to a reduction in the amount of corruption in the economy.

This paper adopts the second viewpoint, i.e. international trade makes an economy more competitive which in turn leads to less corruption. Ades and di Tella (1995, 1997) empirically proved the hypothesis that openness, as measured by the amount of imports (as a proportion of the GDP) and the level of tariffs, affected the level of corruption. An internal Bank research study analyzes the same relationship by using the average level of trade tariffs and the percentage of import goods subject to quota restrictions (for a larger sample than Ades and di Tella), and gets similar results. This paper furthers their research by empirically analyzing how the levels of specific trade taxation (import tariffs, export duties and quota reductions), and the level of trade (as a proportion of GDP) affect the level of corruption in an economy. This analysis is performed in the context of World Bank initiatives on trade liberalization over the last two decades.

Besides the basic question of the impact of trade liberalization on corruption, this paper also attempts to answer another question: Have the World Bank's initiatives in the sphere of trade reform been successful in reducing the level of corruption? Nash et al (1991) and Michaely et al (1991), found that while substantial progress in the area of reductions is quota restrictions (QR) and in the removal of licensing, prohibitions and export taxes, far less progress was made in the area of substantial tariff reform (Dean, page 15). This may imply that while the Bank's general strategy of trade liberalization was successful, countries had trouble finding alternative sources of revenue and thus were reluctant to remove import tariffs (which is a major source of corruption). Thus in the short to medium term, corruption may not be significantly affected by 'successful' trade liberalization policies.

The structure of this paper is as follows: Part II: An analysis of how trade reform can affect the level of corruption in an economy. Part III: An analysis of World Bank's involvement in the area of trade liberalization and how this should impact corruption. Part IV: A simple model to explain the relationship between corruption and trade liberalization. Part V: An empirical analysis of the relationship between corruption and trade liberalization. Part VI: Conclusions.

II. Relationship Between Trade Liberalization and Corruption

The purpose of this section is to present the theoretical relationship between trade liberalization and corruption. As much of the literature on corruption points out, corruption results from the authority (or 'monopoly power') held by certain individuals in an economy, which is used to extract rents in the form of illegal payments and other 'favors'. This authority may permit an official to allocate a commodity at a price below the market equilibrium level, which may result in rent-seeking behavior. Similarly, in the sphere of international trade, this authority may permit an official to regulate the price and quantity of a traded good, decide who is permitted to trade a particular good or decide the exchange rate at which goods are traded. In particular, governmental officials may be permitted to put quantitative restrictions on traded goods, set tariffs on imported goods, tax exported goods and maintain an overvalued exchange rate. Each of these actions may result in increased levels of corruption in an economy and an analysis of the mechanism through which rents are obtained can explain how trade liberalization affects corruption.

Removal of Quotas and other Quantitative Restrictions

Quantitative restrictions (such as quotas) are the result of officials setting limits on the quantity of (certain) traded goods. Tanzi (1993) discusses how quasi-fiscal regulations (i.e. regulations that substitute for taxing and spending), such as quotas, may occur in economies that have particular trade objectives but are having problems in raising the level of taxation. These restrictions may give rise to corruption, since they may result in lobbying by certain sectors of the economy for protection from international competition. Similarly, corrupt activities can flourish in the process in which officials determine how much of a particular good should be allowed as imports and in the process during which import licenses are issued.

But trade liberalization in the form of a complete elimination of quantitative restrictions may not be economically and politically feasible. Alternatively, Dean, Desai and Riedel (1994) describe how restrictions such as quotas should be turned into tariffs to restrict the opportunities for rent-seeking. One cannot say for certain that transformation of quota restrictions into tariffs will lead to lower levels of corruption, but the level of corruption may be counterbalanced by increased government revenues, less inequality among industries and less uncertainty regarding access to imported inputs. It should be noted that complete elimination of non-tariff barriers would have a significant impact on the level of corruption in an economy. But in practice,

non-tariff barriers are replaced by tariff barriers, and thus the impact on corruption of the removal of non-tariff barriers is modest.

Abolition of Tariffs

The tariff system is the most substantial way in which protectionist trade policies affect the level of corruption. As Pritchett and Sethi point out, tariffs on imports generate corruption at two levels. The first level at which corruption is generated is at the revenue collection level. The larger the potential revenues from import tariffs, the greater will be the incentive to offer bribes to revenue collecting officials. These bribes may be to obtain exemptions from import tariffs or to underestimate the level of tariffs due. The second level at which corruption occurs is at the industry level. Firms now have a greater incentive to engage in underinvoicing, misdeclaration and smuggling as the tariff level gets higher.

A major issue that arises in trade liberalization through the abolition of a tariff system is that certain economies may be heavily dependent on the revenues from tariffs. If the immediate abolition of import tariffs is not feasible, the second best alternative is to have a tariff structure that has the least amount of dispersion (which is the variance in tariff rates across goods). This is because a pre-commitment to a tariff rule with minimal variance means that the tariff rate established is prevalent in most sectors, introducing a free-rider problem for groups that are lobbying for protection (through possibly corrupt means). To limit the dispersion of import tariffs, there are two possible alternatives: (i) A uniform tariff rule (implying that tariffs are constant across all commodities); (ii) a series of concertina reductions (which is the process of reducing the highest tariff rates to a specified level while leaving lower rates intact, and then repeating this process until the tariffs have reached a uniform, predetermined level).[2] This reduction in dispersion should have the effect of reducing the incentives for corrupt activities, while the eventual abolition (or low and uniform level) of tariffs should lead to further reductions in corruption.

Removal of Export Taxes and Subsidies

Export taxes and subsidies also provide opportunities for corruption. The discussion of export taxes closely mirrors the discussion on tariffs. The argument presented above concerning the importance of tariff reduction and reductions in corruption is also relevant in this section, though empirically

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[2] Michely, Papageourgiou and Choksi (1991)discuss how the second method results in the least dispersion of tariffs at every stage of tariff reduction.

it can be shown that export taxes contribute far less (than import tariffs) to government revenues. This, in turn, implies both lower levels of corruption and also less reluctance on the part of the authorities to decrease (or eliminate) the levels of export taxes. Export subsidies (on the other hand) are susceptible to corruption because bribes (and/or improper influence) can be used by a certain sector to become the recipient of subsidies. Though in trade theory it is found that export subsidies can be used in conjunction with import tariffs to improve the competitiveness of an economy, gradual reductions in both are needed to combat corruption.

Practically, revenues from export taxes are much smaller than revenues from import taxes. Also, the coverage of import taxes is wider than that of export taxes, in terms of the number of goods covered and the level of effective protection. This implies that initiatives aimed at reducing the levels of export taxes will have modest effects on the level of trade liberalization and the level of corruption.

Exchange Rate Adjustment

Exchange rate adjustment usually occurs in the form of a real depreciation in the currency to accompany policies of trade liberalization. Overvalued exchange rates give rise to illegal markets in foreign exchange and corruption in the system of purchasing foreign exchange from the monetary authorities. But not only is a devaluation necessary, market forces must be allowed to intervene. As Nash and Takacs (1998) explained: "The main lesson is that ensuring the right exchange rate is important in a trade reform program, but the right exchange rate alone is not enough. The entire foreign exchange rate mechanism must be flexible, transparent, and efficient... As long as the allocation of foreign exchange for some or all imports is discretionary, import liberalization cannot advance very far because protection remains opaque and dispersed," (page 6). Exchange rate liberalization has a substantial effect on trade liberalization and corruption, not only because of the fact that market determined exchange rates imply smaller opportunities for corruption in the process of obtaining foreign exchange, but also because the rationalization of exchange rates complements other trade liberalization policies. It is important to note that in some countries financial liberalization of this sort may not be an option (due to reasons such as macroeconomic instability). In this case, the level of corruption can still be reduced by introducing greater transparency in the method in which foreign exchange is dispensed (e.g. through an auction system).

III. The World Bank's Involvement in the Sphere of Trade Liberalization

Since the 1970's, the World Bank has pursued a trade liberalization policy, though it was in the 1980's that a large number of developing countries began to liberalize trade unilaterally. To understand the effects of the Bank's trade liberalization policies on corruption, it would be useful to analyze the types of reforms that were initiated and how these reforms have affected the level of corruption in a country. Initially, the World Bank's ALCID database will be used to determine the types of trade-related initiatives the World Bank has adopted. After this, the outcomes of the trade-related initiatives will be rated to determine their success.   For these ratings, two different sources will be used: The first is a series of studies of the World Bank's trade-related initiatives. The second is the World Bank's Operations and Evaluation Department (OED) ratings for project outcomes.

The World Bank's Trade-Related Initiatives

The World Bank began to focus on trade reform in the 1980's, using both adjustment loans with trade-related conditionalities and trade-specific loans. Figure 1 (based on information taken for the ALCID database), shows that the Bank's trade-related projects began to grow substantially in the mid-1980's.   It also illustrates how the Bank began its efforts by incorporating trade-related conditionalities into adjustment loans in the 1980's, and then began to increase the number of trade-specific projects in the early 1990's.   Eventually, the Bank used both methods with (approx.) equal frequency.
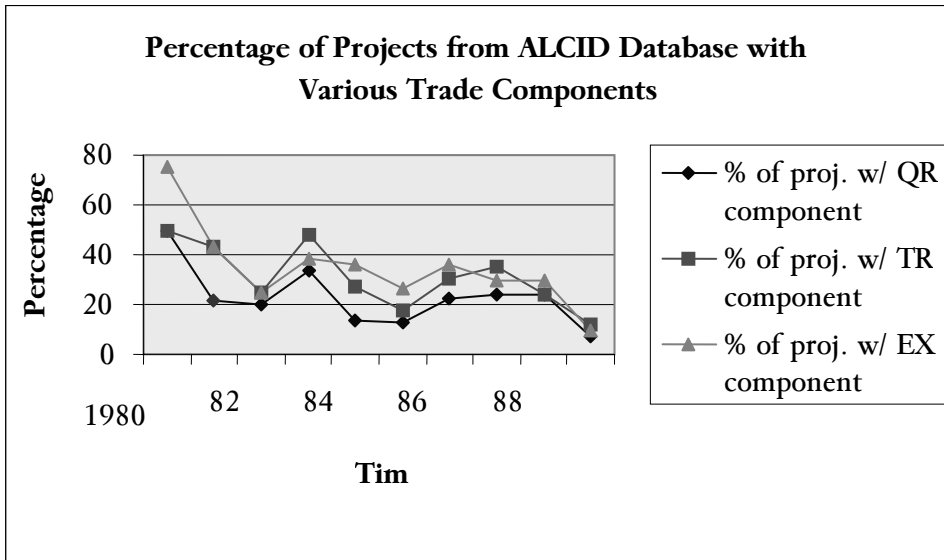
Figure-2 illustrates the three major tools the World Bank uses in its trade-related projects. Quota reduction, tariff reduction and export promotion have been the three major reform areas that the Bank has concentrated on. Two things can be observed from the figure. First, the three elements of trade reform have been used with the same frequency from the years 1980-1990[3]. Second, the importance of trade-related initiatives in Bank projects was at its peak in the early to mid-1980's, when they were included in approximately 30-50% of all Bank projects. After this point, the percentage of projects that included trade-related initiatives has remained steady at about 20%, with a decline to about 10% in the 1990's.

This discussion illustrates the stress the Bank has placed on trade-related initiatives in the 1980's and 1990's. Also, the Bank has focused on three areas of reform: quota reform, tariff reform, and export promotion. It may be useful to see the success with which the World Bank has tackled these areas.

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[3] These are the years for which the ALCID database has information on implementation of conditionalities.

Figure-1: Trends in the World Bank's Trade-Related Lending

Comparison between Adj lending with trade components and trade specific projects

Percentage of Projects from ALCID Database with Various Trade Components
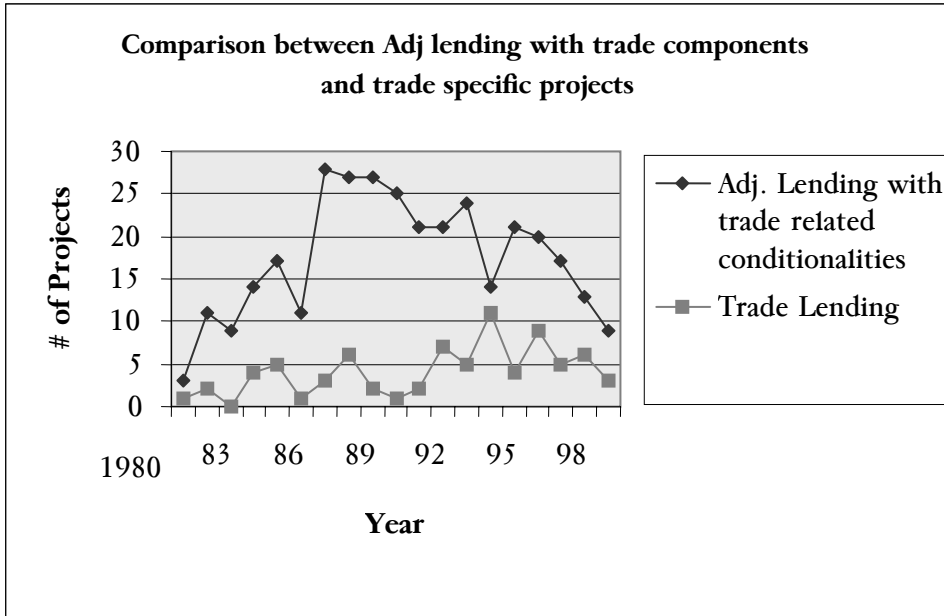
Rating the World Bank's Trade-Related Initiatives

       In order to rate the effects of the World Bank's trade-related initiatives, one can first analyze three comprehensive studies on liberalization policy published by the World Bank: (1) V. Thomas, J. Nash and Associates, *Best Practices in Trade Policy Reform,* 1991 (TN); (2) D. Papageourgiou, A. Choksi and M. Michaely, *Liberalizing Foreign Trade in Developing Countries: Lessons of Experience,* 1990 (PCM); and (3) J. Dean, S. Desai and J. Riedel, *Trade Policy Reform in Developing Countries since 1985,* 1994 (DDR). The first analyzes liberalization episodes in 88 developing countries during the early 1980's (focusing on 24 countries that received trade adjustment loans). The second focuses on early reforms in 19 countries dating back from the 1950's and continuing to 1984. The final study examines the nature and extent of trade liberalization in 32 countries in South Asia, Africa, Latin America and East Asia from the mid 1980's to 1993. These studies will be used to create a series of outcome ratings for the four areas the Bank has concentrated its trade reform efforts on: (i) the removal of quotas, (ii) the removal of tariffs, (iii) export promotion and (iv) the rationalization of the exchange rate. Each area of policy reform was given a rating of Negligible, Modest, Substantial or High.

       Also in each of the four areas mentioned above, a separate series of ratings was created using OED project outcome ratings (either Satisfactory or Unsatisfactory), for a sample of 115 trade-related projects. First, these projects were categorized as projects relating to quota reduction, tariff reduction, export promotion or exchange rate stabilization[4]. Then the average outcome rating was taken for all the projects in each of the categories (with a satisfactory rating being assigned the number 1, and an unsatisfactory rating being assigned the number 0). Finally, in order to convert this into a ratings scale comparable to the one above, the average outcome rating of the projects in each area was converted as follows: 0 - 0.25 = Negligible; 0.26 - 0.5 = Modest; 0.51 – 0.75 = Substantial; and 0.76 – 1.00 = High. These ratings were then averaged with the ratings determined in the paragraph above to obtain an overall outcome rating for World Bank initiatives in each of the four trade-related areas determined from the studies above.

World Bank Initiatives to Remove Non-Tariff Barriers

       The analysis of quota reduction policies yields similar results across the three studies. During the time periods mentioned above, all three

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[4] Though it should be noted that one project can have numerous conditionalities, and thus may be included in more than one category of trade reform.

studies found that countries had made substantial progress in eliminating non-tariff barriers. PCM and TN found a significant number of instances during which countries reduced quotas, with PCM in particular finding that quota reductions were accompanied by devaluations (though no lowering of tariffs). DDR found that a large number of countries in Latin America, East Asia and Africa virtually eliminated explicit quota restrictions (though South Asia had made little progress in reducing quota restrictions), and had replaced these quota restrictions with tariffs. As DDR explained, "It is unclear whether the level of protection on these goods (subject to non-tariff barriers) rose or fell when QRs were replaced by tariffs. However, certainly incentives for rent-seeking were reduced and transparency increased. Since QRs were the binding constraint on trade in many countries, these reductions do represent a significant move toward liberalization," (page 96). Thus the outcome rating in this area, based on the studies mentioned above, is Substantial.

The average OED outcome rating for projects with conditionalities in the area of non-tariff barriers is 0.660, or substantial.

World Bank Initiatives to Remove Tariffs

The evidence on the extent of tariff reform is less obvious, but generally points towards modest progress in the area of tariff reform. PCM find significant decreases in tariffs in fewer than half of the episodes, with a wide variety of methods used (ranging from the concertina method to no method at all). On the other hand, TN found that a large number of cases in which significant progress had been made on tariff reform, with reforms ranging from reductions in the number of rates, the maximum rate and the number of extensions to establishing lower minimum tariffs. However, TN went on to admit that modest progress had been made on reducing the average tariff level and that the dispersion in effective protection remained significantly wide. DDR found that only Latin American countries had made significant progress in lowering the number and dispersion of their tariff rates, and that countries that were highly dependent on tariff revenues were more likely to have higher levels of tariffs after the period of reform. The overall picture that one gets is that tariff reform is progressing steadily, but countries are still reluctant to completely eliminate tariffs due to the central role they occupy in their public finances. The evidence above implies a Modest outcome rating for the Bank's tariff related initiatives.

The average OED outcome rating for projects with conditionalities in the area of tariff barriers is 0.483, or Modest.

World Bank Initiatives to Promote Exports

All three studies found that substantial progress had been made by the countries in promoting exports. TN and PCM found that countries had been quite successful in removing licenses, prohibitions and export taxes, with PCM further finding that direct export incentives were prevalent. DDR also found significant removals of direct disincentives for exporters, which in some cases were replaced with new (though badly designed and inefficient) incentives for exporters. Though all the countries analyzed in the three studies (with the exception of a few South Asian countries) had made substantial progress in removing direct disincentives on exports, all three studies found that far less progress had been made in the area of active export promotion. Thus the outcome rating for this area is Modest.

The average OED outcome rating for projects with conditionalities in the area of export promotion is 0.641, or substantial. Note that the average OED rating differs from the rating obtained from the three studies discussed above.

World Bank Initiatives to Rationalize Exchange Rates

All the aforementioned studies found that real devaluation of the exchange rate was a necessary step for successful trade liberalization. PCM discusses how very few of the analyzed reform episodes had real appreciations accompanying them, while TN noted that countries receiving trade adjustment loans had greater real depreciations of their exchange rates. DDR found that the majority of the 32 countries under study had aimed towards real exchange rate depreciation, and that those countries with the largest black market premia achieved the largest and most sustained depreciations. Thus World Bank initiatives in the area of exchange rationalization have had substantial success, and the outcome rating for these initiatives is Substantial.

The average OED outcome rating for projects with conditionalities in the area of non-tariff barriers is 0.736, or substantial.

Conclusions on World Bank Initiatives

The conclusions that one can draw is that the World Bank has successfully focused on the major trade reform initiatives in its lending. The reform process follows a certain sequence, with the removal of non-tariff barriers and the rationalization of the exchange rate being the initial steps, followed by the promotion of exports (and the removal of

export taxes), and reaching a point where the economy is ready to significantly reduce its import taxes. World Bank lending has been successful in the areas of non-tariff barrier removal and exchange rate rationalization, but has been less so in the areas of export promotion and import tariff removal. This means that the Bank's trade-related initiatives have had a moderate impact on corruption up to this point, with any substantial impact in the future depending on the success of its tariff and export initiatives.

IV. Model to Explain the Relationship between Corruption and Trade Liberalization

In this section, a model is presented to explain the factors that contribute to the level of corruption in an economy. The specific focus is to analyze the effects of trade openness on the level of corruption. But any analysis of corruption must contain a simple model that attempts to discern which particular country-specific factors determine the level of corruption. Thus it would be useful to introduce the simplified model and the relevance of the variables included:

Corruption = f (Trade Liberalization, Level of Growth, Level of Education, Size and Quality of Bureaucracy, Quality of Judiciary)

Trade Liberalization

The arguments for how trade liberalization affects corruption have been discussed in length in the previous sections. This analysis follows Ades and di Tella (1997) and an internal Bank research study, which found that elements of trade liberalization had significant effects on the level of corruption.

The Level of Growth

An analysis of the effects of the level of growth (as measured by the difference in logged GDP) on corruption provides an opportunity to test two interesting hypotheses. One strand of thought would imply that corruption would be more prevalent in an economy that is characterized by high growth (thus more opportunities for corruption) and limited checks (legal, political, etc) on corruption. Thus the possibility exists that in a sample of developing countries, corruption may actually be higher for countries with higher levels of growth. The second point of view would state that corruption is a symptom of a strong economy and that economies that are growing faster are indicating that they have greater

institutional strengths, which in turn should be reflected by lower levels of corruption. Though the analysis that follows will not perfectly distinguish between both ideas, it will provide an opportunity for an interesting discussion.

The Level of Education

The mechanism through which the level of education affects corruption is quite intuitive. As Ades and di Tella (1997) and an internal Bank research study briefly discuss, a better-educated population would have a tendency to reduce corruption. This could work in two ways: First, a better educated population will have less tolerance for observing and participating in corruption and will take actions to reduce it. Second, a more highly educated workforce will lead to a more competitive economic environment, which will force illegal rents down. In both cases, more education should lead to less corruption.

Size and Quality of the Bureaucracy

The size and quality of the bureaucracy (both of which may be inversely related) should be an important factor affecting the level of corruption in an economy. An interesting analysis of the effect of the size of the government on corruption is presented by Goel and Nelson (1998) in which they propose that, "It is, of course, reasonable to expect more political knavery with larger governments. A larger government might also imply greater bureaucratic delay inducing rent-seekers to offer bigger bribes," (page 111). They find that the size of the government, in particular spending by state governments, does have a strong positive influence on corruption. And not only is the size of the bureaucracy important, but as Tanzi (1998) points out, the quality is an important factor that affects corruption indirectly. As Rauch and Evans (1997) found out, the lower is the quality of the bureaucracy (as measured by the number of recruitments and promotions based on merit) the higher is the extent of corruption.

The Quality of the Judiciary

The quality of the judiciary is a fundamental determinant in the level of corruption in an economy. This is because a corrupt judiciary can be influenced through illegal means (such as bribery), while a weak judiciary is unable to prosecute instances of corruption in civil society. Both of these situations force the economic agents in society to resort to illegal means to get any work done, which can become an accepted norm. As Tanzi (1998)

points out, "The lack of transparency in rules, laws, and processes creates a fertile ground for corruption," (page 575). Friedman, Johnson, Kaufmann and Zoido-Lobaton (1999) find that, "The relationship between the share of the unofficial economy and the rule of law is strong and consistent," (page 27), which implies that stronger institutions combating corruption lead to smaller unofficial economies.

V. EMPIRICAL ANALYSIS

a) Data

The data used to find the relationship between trade liberalization and corruption will come from various sources. First, the data on World Bank projects related to trade liberalization will come from the World Bank's Adjustment Lending Conditionality and Implementation Database (ALCID). This database conditions all World Bank projects between 1980 and 1997 (categorized by project objectives), with the economic conditionalities (categorized by sector) attached with each loan. For the projects between 1980 and 1990, the ALCID database also contains implementation ratings for the economic conditionalities associated with each project.

Second, for the cross-country indicators, ratings taken from the International Country Risk Guide (ICRG) will be used. This database contains ratings for (a) corruption (ICRGF), (b) bureaucratic quality (ICRGL) and (c) law and order (ICRGI) on a scale from 0 (most corrupt) to 6 (least corrupt) for a sample of 65 countries, for the years 1983-1998. It is useful to note that the indicators are such that as they increase, the variable under consideration increases. Thus as the ICRGF index increases, corruption decreases. Similarly as the IGRGL and ICRGI indicators increase, the qualities of the bureaucracy and judiciary (respectively) increase. Alternately, cross-country indicators are also taken from the Fraser Institute, which contains indices measuring the (a) size of the government (FRAS-I), (b) the monetary policy of the government (FRAS-III), (c) the legal structure and level of property rights (FRAS-V) and (d) the freedom to trade with foreigners (FRAS-VI) for the years 1990 and 1997. A third source of cross-country corruption ratings is the Transparency International Rating, though they are only available for the years 1996, 1997 and 1998 (TI96, TI97, TI98).

Finally, other macroeconomic data were incorporated into the analysis. This data consisted of the Real Gross Domestic Product per capita (GDP), the revenues from export duties as a percentage of the total exports

(EXPDUT), the revenues from import duties as a percentage of total imports (IMPDUT), the level of current government expenditure as a percentage of GDP (GOVCON), the total revenues from taxes on trade as a percentage of GDP (TAXINT), the value of international trade as a percentage of GDP (TRADE) and the level of primary education enrollment (ENRPRM) and higher education enrollment (ENRHIGH). This data is taken from the IMF Government Financial Statistics, IMF Financial Statistics and the World Bank's World Development Indictors (WDI).

b) Statistical Analysis and Results

The purpose of the statistical analysis is to find the nature and strength of the relationship between the trade liberalization policies and the levels of corruption in countries. The statistical analysis has been performed in two parts. The first section uses a panel of 35 developing and developed countries over the sixteen-year period, 1982-1997, to determine which factors influence the level of corruption. The second section uses a cross-section of 84 countries, for the year 1997, to determine the causes of corruption.

Panel Analysis of the Factors affecting the Level of Corruption

In this section, it is hypothesized that corruption is dependent on the level of growth in the country, the size of the bureaucracy, the quality of the bureaucracy, the quality of the judiciary, the levels of import and export restrictions (as measured by the revenues from import and export taxes), the international competitiveness of the country (as measured by total amount of trade) and the levels of education.

This analysis uses a pooled data set, comprising 35 countries over the ten-year span from 1982-1997. The variables under analysis are: the level of corruption (represented by ICRGF), the change in the level of development of the country (represented by DLGDP), the change in the quality of the bureaucracy (represented by DICRGL), the change in the quality of the judiciary (represented by DICRGI), the change in the size of the bureaucracy (represented by the proxy variable DGOVCON, measuring current government expenditure), the change in the level of export duties (represented by DEXPDUT), the level of imports (represented by DIMPDUT), the change in the level of trade (represented by DTRADE) and the changes in the levels of primary and higher education enrollment (DENRPRM and DENRHIGH, respectively).

In the first stage of the analysis, a correlation matrix was calculated for the aforementioned variables, which is included in the Appendix (Table-A1). In the second stage of the analysis, a series of regressions were performed to determine the factors influencing the level of corruption and to see if trade expansion and trade liberalization lead to significant differences in the level of corruption. The regressions are conducted on the first differences of the variables mentioned above[5] and are divided into two sets of regressions, the first including the variable measuring enrollment in higher education and the second excluding that variable. The reason for this division is that the data for enrollment in higher education is sparse and severely curtails the size of the sample used in the analysis. The results are summarized in Tables 1 and 2 below, and it may be worth discussing some of the results in greater detail.

Effects of Trade Liberalization on Corruption

In the first set of regressions (excluding the higher education variable), the change in the amount of international trade has a small negative effect on the corruption *variable* (in other words, slightly increased the level of corruption).[6] It can be hypothesized that increases in the level of international trade, increases both the opportunities for corruption (at the import tax collection and assessment levels) and the level of corruption (i.e. larger bribes may be required for customs officials, etc. since the quantity of tradeables has increased). It should be noted that this effect is very small (and is insignificant in the second set of regressions) and cannot be used as conclusive evidence about the effect of international trade on corruption.

In both sets of regressions, higher levels of import duties lead to higher levels of corruption, though this effect is small. With this result, one can confidently claim that higher import taxes leads to greater opportunities for officials (both in the customs department and in other spheres of government) to collect rents from individuals seeking to either avoid paying duties completely or having the levels of taxes due to be underassessed. It is interesting to note that the results for the effects on corruption of export taxes is not significant. Here one can hypothesize

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[5] First differences were taken because serial correlation was detected in many of the variables and the null hypothesis of a unit root could not be rejected in the case of ICRGF.

[6] Recall that the corruption variable takes a value of 0 for countries with the highest level of corruption, and a value of 6 for countries with the least corruption, so that an increase in the corruption variable signifies a decrease in the level of corruption in the country.

that though higher export taxes do increase the opportunities for corruption (in the same way that import taxes work), the revenues from export taxes are so much smaller than those for import taxes that taxes on exports will have a negligible effect on the level of corruption. Thus the evidence does point towards the fact that trade liberalizing policies that reduce the levels of trade related taxes do have significant effects on the level of corruption.

Effects of Other Variables on Corruption

At this stage it would be interesting to see the effect of the other variables on the level of corruption.

It was found that improvements in the rule of law (which includes the strength and impartiality of the legal system and the popular observance of the existing laws) lead to decreases in the level of corruption. This is an intuitively appealing result since it says that a stronger legal system will not only be a staunch prosecutor of officials engaging in corruption, it will also empower the public to take a greater interest (in terms of media attention and direct actions in the court system) in the level of systemic corruption in the economy. This is turn increases the risk and has a tendency to dissuade officials from rent-seeking.

The analysis implies that improvements in the quality of the bureaucracy lead to higher levels of corruption. At first glance this may seem counterintuitive. But, it should be kept in mind that the index of bureaucracy measures the stability of the bureaucracy and its ability to resist political pressure. The possibility exists that a more autonomous bureaucracy may actually give the officials the ability to extract greater rents. This may be the case in a bureaucratic system that was established in the past and is resistant to political and economic change, and thus may not be answerable to both the politicians and the public. But this result should be severely qualified.

Finally, changes in the primary school enrollment rates have no significant effects on corruption. Similarly, changes in the enrollment rates in higher education are also not found to significantly affect the level of corruption. Though this may seem puzzling at first, it could be hypothesized that there exists some threshold level of education that affects corruption. Thus for education to affect corruption, the country has to have a certain minimum level of literacy, after which civil society would take a more active and effective interest in the level of corruption in an economy.

Table-1: Regression Results for Panel Data without Higher Education Variable: (T-statistics are in brackets)

Dependent Variable	DGDP	DTRADE	DIMPDUT	DEXPDUT	DICRGI	DICRGL	DENRPRM	DGOVCON	Adjusted R-squared	# of Obs.
ICRGF	9.5E-17 (0.342)	-0.0081 (-1.338)	-0.011 (-1.35)	-0.00084 (-0.1577)	0.325 (4.67)	-0.203 (-2.36)	0.0031 (0.236)	0.0065 (0.3308)	0.319	254
ICRGF	-2.7E-16 (-3.72)	-0.008 (-1.479)	-0.010 (-1.387)	-0.00071 (-0.1366)	0.3097 (4.74)	-0.200 (-2.589)	NA	NA	0.3229	293
ICRGF	-2.7E-16 (-3.77)	-0.0083 (-1.502)	-0.0092 (-1.229)	-0.00099 (-0.1907)	0.3504 (5.46)	NA	NA	NA	0.3080	293
ICRGF	-2.8E-16 (-3.808)	NA	-0.0077 (-1.065)	-0.00148 (-0.288)	0.3067 (4.685)	-0.2022 (-2.61)	NA	NA	0.3241	295

Table-2: Regression Results for Panel Data with Higher Education Variable[6]:   (T-statistics are in brackets)

Dependent Variable	DGDP	DTRADE	DIMPDUT	DEXPDUT	DICRGI	DICRGL	DENRPRM	DEN-RHIGH	DGOV-CON	Adjusted R-squared	# of Obs.
ICRGF	-3.0E-16 (1.21)	-0.0089 (-1.056)	-0.023 (-1.459)	0.0019 (0.0049)	0.189 (2.49)	-0.24 (-2.03)	-0.0161 (-0.732)	-0.775 (-1.071)	0.0091 (0.18)	0.385	85
ICRGF	4.05E-16 (-1.736)	-0.0076 (-0.98)	-0.023 (-1.52)	0.0034 (0.0936)	0.1866 (2.57)	-0.277 (-2.433)	-0.007 (-0.344)	-0.44 (-1.41)	NA	0.3977	88
ICRGF	-3.9E-16 (-6.74)	-0.005 (-0.641)	-0.0125 (-0.856)	0.0052 (0.1634)	0.133 (1.79)	-0.272 (-2.47)	NA	-0.034 (-1.111)	NA	0.435	109
ICRGF	-4.0E-16 (-6.85)	NA	-0.0089 (-0.665)	0.0044 (0.137)	0.1254 (1.715)	-0.279 (-2.55)	NA	-0.036 (-1.22)	NA	0.439	109

[6] The regressions have been performed with and without the higher education variable, because of a significant decrease in the number of observations used when the variable is included.   The results have to be interpreted with this in mind for the regressions with the higher education variable.

Cross-Sectional Analysis of the Effect of World Bank Initiatives on Corruption

In this section, three sets of regressions were performed on a sample of 85 countries to see what factors influenced the level of corruption in a particular country and to also evaluate World Bank initiatives in the area of trade policy reforms in terms of their effect on corruption. For all the regressions in this sections, the 1997 Transparency International indicator for (lack of) corruption (TI97) was used to determine the cross-country level of corruption and the Fraser Indices were used to measure the (i) size of the government (FRAS-I-97), (ii) the monetary policy and price stability of the country (FRAS-III-97), and (iii) the legal structure and level of property rights in the country (FRAS-V-97). Similar to the ICRG indicators, it is useful to note that the indicators are such that as they increase, the variable under consideration increases. Thus as the TI97 index increases, corruption decreases. Similarly as the FRAS-V-97 indicator increases, the quality of the judiciary increases. The other variables in the analysis are the quantity of trade as a percentage of GDP (TRADE97), which was used to measure the openness of each economy and the natural log of the GDP (LGDP-97), which was used to measure the size of the country. The distinguishing feature in each of the regressions was the use of different variables to represent the level of trade openness.

Regressions Using the Fraser Index for Trade Liberalization

In this set of regressions, the level of trade liberalization in a country is measured by the Fraser index for freedom to trade (FRAS-VI-97). At this point, it would be useful to discuss the nature of the Fraser index on freedom of trade. The index is a weighted average of: (i) revenues from international trade as a percentage of exports and imports (0.214), (ii) the mean tariff rate (0.227), (iii) the standard deviation of tariff rates (0.117), (iv) the percent of international trade covered by non-tariff restraints (0.198), (v) the actual size of the trade sector compared to the expected size (0.105), and (vi) the difference between the official and black market exchange rate (0.139)[7]. The results of the regressions are presented in Table 3. The Appendix contains a correlation matrix for the variables used in the regression analysis (Table A2).

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[7] Principal component analysis was used to determine the weight given to each component in the construction of the area index. This procedure partitions the variance of a set of variables and uses it to determine the linear combination--the weights--of these variables that maximizes the variation of the newly constructed principal component. In effect, the newly constructed principal component--an area rating, for example--is the variable that most fully captures the variation of the underlying components.

The regressions using the Fraser index show that trade openness has a significantly large effect on corruption, or that the more liberal the trade regime of a country, the lower is the level of corruption. Since the Fraser index takes into account tariff and non-tariff barriers, it can be reasonably hypothesized that lower tariff and non-tariff barriers lead to fewer opportunities for rent-seeking (in terms of taking bribes for lower tax payments or exemptions). Not only do the opportunities for rent-seeking decrease, but the increased competitiveness of the economy that results from trade liberalization leads to lower available rents.

Regressions Using Project Implementation Ratings for Trade Liberalization

For this section, 114 trade-related projects, implemented between the years of 1980 and 1990, were chosen from the World Bank's Adjustment Lending Conditionality and Implementation Database (ALCID). Projects were chosen based on the fact that corruption indicators were available for the country and that the projects had implementation ratings. The trade related conditionalities in each project were first divided into three categories: (i) the reduction (and total elimination) of tariffs, (ii) export related initiatives (which were defined as policies that were related directly to export promotion and those that were related to reductions in export taxes) and (iii) the reduction (and total elimination) of quotas. The second step was to determine the average implementation ratings for the conditionalities in each of the areas mentioned above; thus each project had an average rating for quota reducing initiatives, tariff reducing initiatives and export related initiatives. Again it is useful to note that the higher is average implementation rating the more successful the project. Finally, each country (of the total 85 countries) was given a rating in the area of tariff reduction (ITTR), export related initiatives (ITEX) and quota reduction (ITQR), based on the averages calculated above. The purpose of these variables was to test if successful implementation of the Bank's trade related initiatives had a significant effect on corruption.

The regressions using the World Bank's implementation ratings for trade related projects yielded interesting results, and are shown in Table 4. As the implementation ratings for tariff reduction policies and export related initiatives increase (i.e. the policies are implemented successfully by the country), the level of corruption decreases. Thus countries that successfully implement the Bank's tariff and export related conditionalities have a tendency to have lower levels of corruption. But, increases in the implementation ratings for conditionalities dealing with quota reductions had no impact on the level of corruption. This is perhaps due to the fact

that most quotas are replaced with a system of tariffs, so there is no significant decrease in corruption. Also (as in the last section), the tariff related initiatives have a greater effect on the level of corruption than the export related initiatives. This can be attributed to two factors. First, tariff revenues are much larger than export tax revenues, and thus changes in tariff policy have a greater effect on reducing the opportunities for rent-seeking. Second, in practice, import tariffs have a larger effect on the international competitiveness of an economy than more limited export taxes. Thus as import tariffs are reduced, competitiveness increases and the level of illegal rents (and the level of corruption) are driven down.

Regressions Using OED Outcome Ratings

The third part of this analysis replaces the implementation ratings used above with average OED outcome ratings for trade-related projects in the 85 countries under analysis[8]. The purpose of this is to see if countries with 'successful' (as evaluated by the OED) trade-related projects had lower levels of corruption. To obtain an average trade-related outcome rating (OEDOUT) for each country, all the trade related projects from that country were taken, and the outcome ratings (which are either Satisfactory (1) or Unsatisfactory (0)) were averaged over the projects. The results are summarized in Table-5 (with the correlation matrix in the Appendix, Table A2) and yield some interesting conclusions.

It was found that countries whose trade related projects have been given a satisfactory OED outcome rating have significantly lower levels of corruption than countries with projects that have been found to be unsatisfactory. Though there has been no distinction made between what different types of projects (e.g. projects that deal with quota reduction or tariff reduction), the conclusion can be drawn that World Bank initiatives in the area of trade reform have had significant effects on levels of corruption, over the period 1980-1997.

At this point, it is interesting to note that the level of trade in an economy is not a significant determinant of the level of corruption, in any of the three sets of regressions. Since the analysis is a cross-country analysis, one can hypothesize that even though changes in the level of trade (as was measured in the regressions of the previous section) may affect the level of corruption (because greater trade may either increase opportunities for corruption or increase competitiveness and decrease

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[8] Note that OED outcome ratings are for projects implemented between the years 1980-1997.

corruption), the actual level of trade may not affect corruption. In other words, just because one country trades more than another country, this does not mean that it is more susceptible to corruption. Rather, if there are significant *changes* in the level of trade within a country, the level of corruption is affected.

The Effect of other Variables on Corruption

It is also illustrative to analyze the effects of the other included variables on the level of corruption. First, it was seen that corruption is significantly affected by the size of the government. The results imply (as were previously found) that countries with larger governments have a tendency to be more susceptible to corruption. This is because a larger government implies an increased number of rules and regulations, including licenses, permits and authorizations of various types. The resulting monopoly power of the state enables it to extract illegal rents or engage in other acts of corruption.

Secondly, it was found that corruption is significantly affected by the legal structure and quality of property rights in a country. Thus a country with greater security of property rights and viability of contracts tends to have less corruption than countries that do not benefit from these characteristics. This is because people will take more actions to catch perpetrators of corruption if they think that the judicial system is willing to punish acts of corruption. Also, countries with strong judicial systems have a tendency to take direct actions against corruption, such as setting up anti-corruption commissions or ethics offices. However, it should be noted that the existence of such commissions does not guarantee lower levels of corruption.

Table-3: Regression Results for Cross-country Analysis, Using Fraser Index of Trade Openness: (T-statistics are in brackets)

Dependent Variable	FRAS-I-97	FRAS-III-97	FRAS-V-97	FRAS-VI-97	TRADE-97	LGDP-97	Adjusted R-squared	# of Obs.
TI97	-0.478 (-2.61)	0.0932 (1.29)	0.339 (1.412)	0.268 (1.85)	0.009 (0.74)	-0.0737 (-0.566)	0.35	41
TI97	-0.529 (-3.56)	0.107 (-1.65)	-0.285 (-1.413)	0.328 (2.66)	NA	NA	0.42	43
TI97	-0.449 (-3.096)	NA	0.482 (2.159)	0.309 (2.443)	NA	NA	0.387	43

Table- 4: Regression Results for Cross-country Analysis, Regressions Using Project Implementation Ratings for Trade Liberalization:
(T-statistics are in brackets)

Dependent Variable	FRAS-I-97	FRAS-III-97	FRAS-V-97	TRADE-97	LGDP-97	ITQR	ITTR	ITEX	Adjusted R-squared	# of Obs.
TI97	-0.184 (-0.859)	0.016 (0.175)	0.465 (1.80)	0.019 (1.13)	-0.179 (-1.36)	0.017 (0.966)	0.018 (1.33)	0.012 (0.632)	0.219	23
TI97	-0.24 (-1.14)	0.011 (0.127)	0.621 (2.83)	NA	-0.22 (-1.75)	0.019 (1.05)	0.033 (1.37)	0.009 (0.481)	0.202	23
TI97	-0.23 (-1.29)	NA	0.62 (2.95)	NA	-0.21 (-2.02)	0.018 (1.13)	0.032 (1.55)	0.008 (0.48)	0.262	23
TI97	-0.391 (-1.622)	0.114 (1.36)	0.515 (1.96)	0.024 (1.41)	-0.24 (-1.799)	NA	0.066 (3.09)	0.029 (1.51)	0.466	24
TI97	-0.258 (-1.14)	NA	0.572 (2.15)	0.024 (1.37)	-0.17 (-1.37)	NA	0.06 (2.8)	0.033 (1.66)	0.439	24
TI97	-0.335 (-1.49)	NA	0.745 (3.11)	NA	-0.209 (-1.635)	NA	0.061 (2.76)	0.029 (1.44)	0.412	24

Table -5: Regression Results for Cross-country Analysis, Using OED Outcome Ratings:
(T-statistics are in brackets)

Dependent Variable	FRAS-I-97	FRAS-III-97	FRAS-V-97	TRADE-97	LGDP-97	OEDOUT	Adjusted R-squared	# of Obs.
TI97	-0.324 (-2.01)	0.031 (-0.46)	0.47 (2.05)	0.006 (0.45)	-0.099 (-0.86)	1.64 (2.57)	0.327	39
TI97	-0.304 (-1.91)	-0.037 (-0.56)	0.377 (1.873)	0.01 (0.793)	NA	1.684 (2.332)	0.387	39
TI97	-0.334 (-2.107)	-0.032 (-0.48)	0.510 (2.43)	NA	-0.117 (-1.091)	1.68 (2.69)	0.343	39
TI97	-0.317 (-2.03)	-0.0362 (-0.56)	0.407 (2.15)	NA	NA	1.710 (2.86)	0.339	40

Part-VI: Conclusions

This paper attempted to define the relationship between corruption and trade liberalization. The reason for this was to: (1) determine which elements of a trade liberalization policy will significantly affect corruption,

(2) determine the effects of the World Bank's trade liberalization policies on the level of corruption and (3) empirically determine the effect that trade liberalization has on corruption.

The World Bank's trade liberalization policy focuses on four major initiatives, each of which has a different effect on the level of corruption in an economy. The following results were found:

(i)   The removal of non-tariff barriers has been implemented with substantial success by the World Bank. Though this implies a decrease in corruption because of the reduction in the incentives to circumvent these barriers, experience has shown that these barriers are usually replaced with tariffs, which increase the level of corruption. Thus, the impact of this policy on corruption is modest and the overall impact of the Bank's policies in this area is modest.

(ii) The reduction (and abolition) of tariffs can lead to a substantial decline in corruption at both the tax collection level and at the importer level. Lower tariffs mean less corruption when government officials assess and collect taxes. Similarly, lower tariffs mean fewer bribes to officials from business people trying to protect their industries (with the imposition of tariffs) or importers trying to liberalize their sector (with the removal of tariffs). Finally lower tariffs mean more trade, which increases the competitiveness of the economy, which in turn reduces the opportunities for rent-seeking. But World Bank initiatives in this area have had modest success, and thus the overall impact of Bank initiatives in this area is modest.

(iii) Though initiatives to promote exports and remove export taxes should lead to substantial declines in the level of corruption, the impact of the World Bank's initiatives in this area have been modest. Taxes on exports are susceptible to corruption at the assessment and collection stages, and reductions in these taxes should reduce the illegal rents available to corrupt officials. Export promotion schemes should lead to higher volumes of trade, making the economic environment more competitive. This in turn should drive down the levels of the illegal rents. But empirical evidence shows that the effect of export taxes on corruption is far lower than that of import taxes (which reduces the role of export taxes in fighting corruption), and that export promotion schemes have had little impact on the level of trade. This implies that the export related initiatives have had only modest effects on corruption. Since the Bank's policies in the area of export promotion

have also had modest success, the overall impact of the Bank's export promotion policies has been modest.

(iv) Exchange rate policies have a substantial effect on corruption because they usually reduce the black market premium, which should reduce corruption in the foreign exchange market. These policies also promote trade, which in turn makes the economy more competitive and reduces the level of illegal rents available. Finally, successful exchange rate policies tend to complement other policies of trade liberalization (such as tariff reform and export promotion), which in turn lead to further reductions in corruption. The World Bank has made substantial progress in the area of exchange rate reform, which in turn implies that these initiatives have had a substantial overall impact on the level of corruption.

A statistical analysis also sheds light upon the relationship between corruption and trade liberalization. Using different measurements of corruption, it was found that:

(1) Higher import duties led to higher corruption, which implies that successful policies aimed at tariff reform should reduce the level of corruption in an economy.

(2) Higher export taxes had a negligible effect on the level of corruption, which in turn implies that successful policies aimed at export promotion have little impact on the level of corruption.

(3) Absolute levels of the quantity of trade of a country have little impact on the level of corruption, but changes have a small impact. This means that a country that trades more does not necessarily have a higher level of corruption. Rather, a country that experiences a large increase in their quantity of trade will possibly also experience a slight increase in their level of corruption.

(4) The greater the success with which World Bank policies on tariff reduction have been implemented in a particular country, the lower is the level of corruption in that country. Thus World Bank initiatives in the area of tariff reform have been successful in reducing the level of corruption.

(5) The success of World Bank initiatives in the sphere of export promotion has had little effect on the level of corruption. This is mainly because successful export promotion has focused on the

reduction in export taxes (that are significantly smaller than import tariffs), while expansion in the level of exports has been less of a focus and less successful.

(6) The openness of the economy (in terms of the level of trade and the level of tariff and non-tariff barriers) has had a significant effect on the level of corruption. Thus in general, when the economy becomes more open, the level of corruption has a tendency to decrease.

(7) It was found that countries whose trade related projects have been given a satisfactory OED outcome rating have significantly lower levels of corruption than countries with projects that have been found to be unsatisfactory. Thus, 'successful' (as found by the OED) World Bank initiatives in the area of trade reform have had significant effects on levels of corruption, over the period 1980-1997.

Thus it was found that trade liberalization has a significant impact on the level of corruption. It was also determined that one of the most potent tools of trade liberalization in combating corruption is the reduction in import tariffs. But the sequencing of trade policy reforms is such that before one can reduce import duties and successfully expand the level of exports (both of which reduce the level of corruption), one has to go through exchange rate rationalization and the removal of non-tariff barriers.

The World Bank's trade liberalization policy has succeeded in getting through the first two steps of the sequence, i.e. exchange rate rationalization and the removal of non-tariff barriers. It is steadily making progress in the aim to reduce and eventually abolish import tariffs, and it is this initiative that has lead to the most significant decreases in the level of corruption. But for corruption to continue to decrease, further progress must be made in the sphere of tariff reduction and export promotion.

APPENDIX

Table-A1: Correlation Between Corruption Indicator and Other Variables

	ICRGF	ICRGI	ICRGL	GDP	TRADE	IMPDUT	EXPDUT	GOVCON	ENRPRM	ENRHIGH
ICRGF	1.0000									
ICRGI	0.3152	1.0000								
ICRGL	0.1484	0.4695	1.0000							
GDP	-0.0284	0.0974	0.0611	1.0000						
TRADE	0.0206	0.0911	0.0746	-0.0248	1.0000					
IMPDUT	-0.0456	-0.2506	-0.0416	-0.1594	0.0779	1.0000				
EXPDUT	-0.0984	-0.1895	-0.2095	-0.0455	-0.2369	0.1641	1.0000			
GOVCON	-0.0487	-0.0916	-0.0245	-0.0359	0.3696	0.2851	-0.1021	1.0000		
ENRPRM	0.0732	0.1452	-0.0298	0.0599	0.1311	-0.4583	-0.2617	-0.0780	1.0000	
ENRHIGH	0.0106	0.3667	0.1434	0.1367	0.1588	-0.1891	-0.3361	-0.0780	0.0245	1.0000

Table-A2: Correlation Between Corruption and Other Variables:

	TI97	FRAS-I-97	FRAS-III-97	FRAS-V-97	FRAS-VI-97	LGDP-97	ITQR	ITTR	ITEX	OEDOUT
TI97	1.000									
FRAS-I-97	-0.421	1.000								
FRAS-III-97	0.191	0.169	1.000							
FRAS-V-97	0.470	-0.114	0.430	1.000						
FRAS-VI-97	0.347	-0.190	0.064	0.249	1.000					
LGDP-97	0.065	-0.013	0.201	0.621	0.163	1.000				
ITQR	1.000	-0.421	0.191	0.470	0.347	0.065	1.000			
ITTR	0.201	0.255	-0.166	-0.259	0.082	-0.019	0.201	1.000		
ITEX	0.391	-0.343	0.040	0.100	0.003	-0.040	0.391	-0.130	1.000	
OEDOUT	0.332	0.206	0.253	0.342	0.234	0.128	0.332	-0.014	-0.035	1.000

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Book Review

M. Asghar Khan, *We've Learnt Nothing from History; Pakistan: Politics and Military Power*, Oxford University Press, Karachi. pp 306, Price Pak Rs. 450/-

The writer M. Asghar Khan was Pakistan's youngest Air Marshal and the first indigenous CnC, who was also later the Chairman of PIA. M. Ashgar Khan is the author of a number of books, *Pakistan at the Cross Roads, Generals in Politics*, and *Islam, Politics and the State-The Pakistan Experience*. His professional life has been spent serving Pakistan, where he proved to be one of the best at whatever task he sought to perform. His political life has been expended in trying to restore democracy and law and order in the nation, thus his entrance into Pakistani politics at a time when some one with an honest character and moderate means would not have done so.

At the outset of this book he narrates an incident that proves his patriotism and complete dedication to Pakistan. M. Asghar Khan was to leave Pakistan for higher education in Indonesia, and during his preparations to go he met with the Quaid, and sought his permission to leave, upon which the Quaid replied "No, you must not go to Indonesia. Pakistan will need good pilots". M. Asghar Khan became the Air Marshal and proved his mettle when he single handedly came out with the 1965 heroic deed of destroying the efforts of the Indian Air Force, which was about six times greater in might.

Apart from these political and career driven struggles there is an undercurrent of M. Asghar Khan's genuine concern for the poverty-stricken and uneducated. He has filed human rights petitions against prominent Pakistani figures, and is constantly showing concern at the misuse of public money for political purposes.

This book is a narrative of contemporary history through the eyes of M. Asghar Khan, who always wanted Pakistan to be a country of law abiding people. After his service to Pakistan the author entered politics in 1968. This time is what he writes about in the first ten sections of the book, he states himself that this book has the same facts told in his earlier book *Generals in Politics* which was not allowed to be published in Pakistan. He

goes on to narrate the prelude to the debacle and ultimate tragedy of East Pakistan and the emergence of Zulfiqar Ali Bhutto as a political force. In his own ways the author narrates reasons he sees for the dismemberment of Pakistan. He actually recounts in the book the hard times Pakistan faced politically and various Human Rights issues under Bhutto from 1972-77, when he was the primary political opponent of Bhutto. This opposition is evident of M. Asghar Khan's naivety and unfamiliarity with politics and politicians in those early years.

After the death of Zulfiqar Ali Bhutto at the hands of Tara Masih the author stops on the political history front and from then on the book takes a turn into some of his political thoughts. These thoughts are primarily based on his experiences, his love for the nation and his foresight into what he thinks will work in Pakistan.

From section eleven till twenty the author talks about various topics such as the developing role of the ISI from its role as a source of reliable information for the politicians and the army, to its eventual "advisory" role under Bhutto. He also discusses the need to make Balochistan a federation, because of its alienated nature and radical cultural diversity. Section thirteen talks about a proposal by the author to divide Pakistan into twelve provinces to cater to the urge for small administrative or national units. The next section discusses the need to re-administer land holdings for better output and supervision. Then the author talks about a critical issue in Pakistani mentality, corruption, and how it has permeated into the mind sets and systems of the nation, and how it has impeded our growth and made our visions blurred and myopic. Section sixteen elaborates on the need for devolution of power so that politics becomes a source of serving the people rather than a race for the acquisition of power. Then the author deals with the controversial issue of Pakistan's stand on *Jihad* briefly, and eloquently states the "... irony that the 'crusade' launched by President George Bush against terrorism is in fact a struggle to control the monster that the United States has itself created." Again he talks about a much familiar issue, Indo-Pak relations, the need for a solution for Kashmir and the inevitable nuclear stand off which is draining vital resources from both nations which could be put to better economic use. Towards the end the author discusses what he sees as the future of Pakistan's democracy and the book concludes with the author's appraisal of General Pervez Musharraf's five years in power consequent upon the re-entry of the armed forces in the country's politics in 1999, after a brief and tumultuous interlude with democracy.

A subtle theme of the book is the author's views on how the Pakistan Army has always meddled in the Pakistani political arena. Through the emergence of marshal law eras under Ayub Khan, Zia-ul-Haq and Pervaiz Musharraf the author has detailed the slow progression of Pakistan away from democratic ways. This theme also includes the author's continual disappointment with each government and the systems they encouraged. These thoughts are also in the authors' mind because he himself was a strict disciplinarian and renowned as one of those people whose examples of integrity and character are put forth. But this disappointment also brooks hope, and optimism that ultimately justice will prevail.

This book is an insightful exploration of Pakistani history and the more sublime aspects of power and the people wielding it, thus making it a must read for people from all walks of life.

Lahore School of Economics   **Rabia Khan**
Lahore

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1. Manuscripts of research articles, research notes, review articles, comments, rejoinders and book reviews - in English only - should be sent in duplicate together with floppy in MS - Word to the Editor, *The Lahore Journal of Economics*, 105, C-2, Gulberg-III, Lahore-54660. The articles may also be submitted as an email attachment and sent to: nina_lse@yahoo.com. Each request for a book review in the journal must be accompanied by one copy of the book concerned.

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