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Editorial Staff: Tele. No: 0092 - 42 - 36560969
Telefax: 0092 - 42 - 36560905
E-mail: nina@lahoreschool.edu.pk, nina_lse@yahoo.com
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Correspondence relating to subscriptions and changes of address should be sent to *The Lahore Journal of Economics*, 104 -C-2, Gulberg-III, Lahore - 54660 – Pakistan.

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Education and Maternal Health in Pakistan: The Pathways of Influence

Shandana Dar* **and Uzma Afzal****

Abstract

Although numerous studies have explored the relationship between education and women's health-seeking behavior, the role of education – and the pathway through which it affects health-seeking behavior – remains unclear. We use data from the Pakistan Demographic Health Survey for 2006/07 on women aged 15–49 who had given birth at least once in the last three years to determine which socioeconomic factors affect maternal healthcare use, and how the effect of women's own education is transmitted to their health-seeking behavior. We implement two estimation techniques: (i) a two-step instrumental variable linear probability model, in which women's exposure to mass media is used as an instrumental variable for their health knowledge; and (ii) a community fixed effects model. The results of the analysis indicate that predisposing factors – such as women's level of education, their children's birth order, their spouse's level of education, type of occupation, and empowerment – are important determinants of maternal health-seeking behavior in Pakistan. The results also confirm the important role played by women's own health knowledge, independent of their education, on their maternal healthcare use.

Keywords: Maternal health, education, health knowledge, instrumental variable analysis, mass media exposure, Pakistan.

JEL classification: C26, I15, I29.

1. Introduction

The World Health Organization (WHO) defines maternal health as the "health of women during pregnancy, childbirth and postpartum period." While motherhood should be a positive and fulfilling experience, for far too many women, giving birth is associated with suffering, ill health, and even death (WHO, 2006).

Although women play a principal role in shaping society, they remain at alarmingly high risk of maternal morbidity and mortality. Every

* Lahore School of Economics, Pakistan.
** Assistant Professor and Research Fellow, Lahore School of Economics, Pakistan.

life lost in pregnancy and childbirth has multiplicative effects, given that it is women who are responsible for bringing up children and managing household affairs (Tura & Gebremariam, 2008). These spillovers of maternal health begin from the time a woman becomes pregnant. Decisions made during pregnancy, at the time of delivery, and post-delivery have lifelong implications for mother and child alike. Decreasing maternal mortality is, therefore, one of the most important global agendas of health.

WHO (2013) reports that the maternal mortality ratio (MMR) in Pakistan was 260 per 100,000 live births in 2010. Estimates show that, although Pakistan's MMR has declined by 47 percent since 1990, the country's performance lags behind others. The Government of Pakistan has made extensive efforts to decrease maternal mortality through a number of vertical and horizontal mother-and-child healthcare programs, such as the Family Planning and Primary Healthcare Program (Lady Health Workers Program) and National Maternal and Child Health Program. Although overall spending on health has increased, the share of health expenditure as a percentage of GDP remains low at 0.42 percent in 2014/15. Pakistan has made moderate progress in achieving some of the Millennium Development Goals, such as universal female health worker coverage by 2015, but the goal to reduce maternal mortality to 140 deaths per 100,000 births and child mortality to 52 deaths per 1,000 births will not be achieved by 2015.

There is an extensive body of literature on the socioeconomic determinants of maternal health in Bangladesh, India, and Nepal, but a dearth of such studies on Pakistan. Moreover, the existing studies have limited application for Pakistan at large because they employ data from specific regions or provinces of the country. Most recognize the direct effect of some socioeconomic determinants on maternal health-seeking behavior (age, birth order, or previous fetal loss). However, determinants such as education can affect health-seeking behavior through multiple channels. Other branches of health literature, such as child health, have studied at length the pathway through which education affects the health-seeking behavior of an individual. Nevertheless, few studies underpin this causal mechanism in the literature on maternal health.

This paper is an extension of existing studies that identify key socioeconomic determinants of maternal healthcare utilization by women in developing countries such as Pakistan. Its twofold objective is to (i) determine which socioeconomic factors affect women's use of maternal healthcare services in Pakistan, and (ii) identify the pathway through which

the effect of women's education is transmitted to their maternal health-seeking behavior.

We draw on data from the Pakistan Demographic Health Survey (PDHS) for 2006/07, which covers approximately 92,340 households. Carried out by the National Institute of Population Studies with the explicit goal of providing much-needed reliable information on maternal and neonatal health in Pakistan, the PDHS gives a comprehensive picture of marriage, fertility preferences, use of family planning methods, and maternal healthcare utilization. It is, therefore, well suited to our purposes. We use the instrumental variable (IV) technique to estimate the determinants of maternal health behavior; the choice of instrument for the endogenous variable is based on the literature. The results identify women's educational attainment and that of their spouses, women's health knowledge, and their children's birth order as important determinants of maternal health-seeking behavior in Pakistan.

The structure of the paper is as follows. Section 2 provides an overview of the literature on maternal health behavior. Section 3 describes the dataset used, and Section 4 outlines the conceptual framework and econometric methodology. Our empirical findings are presented in Section 5, followed by a conclusion and policy recommendations in Section 6.

2. A Review of the Literature

A vast body of theoretical and empirical literature examines the socioeconomic determinants of maternal health-seeking behavior among women in developing countries (see, for example, Elo, 1992; Bhatia & Cleland, 1995; Celik & Hotchkiss, 2000; Gyimah, Takyi, & Addai, 2006; Mumtaz & Salway, 2007; Sepehri, Sarma, Simpson, & Moshiri, 2008; Amin, Shah, & Becker, 2010; Singh, Rai, Alagarajan, & Singh, 2012). Given the need to improve maternal health in Pakistan, however, there is a surprising dearth of empirical studies in this context. This study aims to fill this gap.

Among others, a mother's age is a well-established determinant of maternal health behavior. The use of antenatal care and assisted delivery is higher among older women, implying that maternal age serves as a proxy for women's accumulated knowledge (Elo, 1992). At the other end of the spectrum, some studies argue that the use of maternal healthcare is higher among adolescent women who are emotionally less mature and lack reproductive knowledge (see Amin et al., 2010; Singh et al., 2012).

Numerous studies point to the positive effect of women's schooling on their maternal health-seeking behavior (see Elo, 1992; Celik & Hotchkiss, 2000; Amin et al., 2010; Singh et al., 2012). An interesting observation is that education has a direct and indirect effect on outcome variables. While schooling increases women's health knowledge, the cognitive skills acquired at school increase their ability to assess and assimilate information, and increase their stock of health knowledge even after they leave school. Yet, despite the accepted importance of education for maternal health, most studies have failed to identify the underlying mechanism through which women's schooling affects their health-seeking behavior. Some exceptions are Elo (1992), Celik and Hotchkiss (2000), and LeVine, LeVine, Rowe, and Schnell-Anzola (2004), who argue that education transforms household dynamics and modifies women's beliefs such that educated women are better able to process knowledge. However, while Elo (1992) and Celik and Hotchkiss (2000) discuss the possible means through which women's education affects their health-seeking behavior, they do not empirically test any such mechanism.

The more recent literature on child health underpins the education–health nexus (see Thomas, Strauss, & Henriques, 1991; Glewwe, 1999; Kovsted, Pörtner, & Tarp, 2002; Webb & Block, 2003; Afzal, 2013). The empirical evidence suggests that much of the education effect translates into health-seeking behavior through the health knowledge that women accumulate with the help of the literacy and numeracy skills they acquire at school.

However, Glewwe (1999), Kovsted et al. (2002), Webb and Block (2003), and Aslam and Kingdon (2012) suggest that, while health knowledge enables women to recognize the need for healthcare, the use of healthcare services helps women acquire additional health knowledge. Health knowledge may, therefore, be an endogenous variable per se if correlated with unobservable individual characteristics as well as with the outcome variable of interest. Studies have tackled this endogeneity issue by using the IV technique, where the most widely used instruments for health knowledge are mass media exposure, maternal education and the presence of close relatives.

To control for this endogeneity issue, we use women's exposure to mass media as an IV for their health knowledge, following the methodology of Glewwe (1999) and Aslam and Kingdon (2012). Glewwe uses household ownership of a radio or television and the availability of newspapers to represent mass media exposure, although the former does not necessarily mean that women have access to the content they convey. Aslam and

Kingdon take this a step further and consider a woman exposed to mass media only if she reports watching television. Even so, this approach to capturing mass media exposure indicates neither the frequency with which women watch television nor the type of programs they view. For this study, we use the criterion "heard/watched a family planning program on radio or television in the last month" as an instrument to measure the type of programs women view.

Children's birth order is also a key factor in determining whether a woman seeks healthcare. One possible explanation for this is that a woman expecting her first child is more likely to be cautious and rely on medical assistance than women at a higher birth order. Those who have had more children tend to attach less importance to pregnancy, particularly if they have not experienced difficulties during previous pregnancies (Elo, 1992; Celik & Hotchkiss, 2000). Similarly, women who have experienced fetal loss have a higher likelihood of being cautious and using maternal healthcare (Midhet, Becker, & Berendes, 1998).

Prior studies recognize that the patriarchal nature of most Asian societies mean that women's position is multidimensional and intra-household decisions are complex. Male involvement in reproductive healthcare utilization is, therefore, increasingly recognized. Furuta and Salway (2006) establish that female autonomy is not restricted to control over household finances in the Asian context. They find that women's propensity for discussing family planning with their husbands has a significant effect on the uptake of maternal healthcare. The study captures the extent of women's empowerment using data on discussions between husband and wife concerning the place of delivery of the last child as a proxy.

The literature also stipulates that wealthier households use maternal healthcare services more frequently than less affluent households. Similarly, larger families limit the amount of resources available to each family member, reducing the affordability and use of maternal healthcare (see Shariff & Singh, 2002; Mumtaz & Salway, 2007; Singh et al., 2012). A more widely used measure of household wealth is a composite wealth index comprising the household's durable assets as well as characteristics.

Another important determinant of maternal healthcare at the individual level is geography, which includes community-level factors such as physical access to a hospital or pharmacy or the state of road infrastructure (see Elo, 1992; Celik & Hotchkiss; 2000, Gyimah et al., 2006; Gage & Calixte, 2006; Sepehri et al., 2008; Amin et al., 2010). After adjusting

for individual-level factors, Gage and Calixte (2006) find that poor roads and lack of transportation significantly reduce the likelihood that a woman will receive antenatal care and make four or more antenatal care visits. The availability of a health center within 5 km, however, significantly increases mothers' use of medical assistance.

To some extent, the literature has examined factors determining maternal health-seeking behavior in Pakistan (see, for instance, Midhet et al., 1998; Nisar & White, 2003; Mumtaz & Salway, 2007; Dasgupta, Mansuri, Sinha, & Vishwanath, 2007; Ali, Bhatti, & Kuroiwa, 2008; Agha & Carton, 2011; Hou & Ma, 2011). However, most of these studies draw on simplified assumptions and estimation techniques, which renders their results questionable. Moreover, their scope is limited because they include data from specific regions and provinces of Pakistan. While the recent literature on other countries might provide valuable insight into maternal health, it is important to account for local contexts when developing social policies.

Most studies on maternal health use only antenatal consultation as a dichotomous dependent variable, although WHO (2006) and Sepehri et al. (2008) argue that full antenatal care comprises tetanus toxoid injections and the frequency of visits to a healthcare facility. In addition, unlike prenatal care and safe delivery, the role of postnatal care as a pillar of safe motherhood is relatively untapped in the literature. Agha and Carton (2011) and Hou and Ma (2011) are two recent studies that employ postnatal care provided by a trained service provider as a component of maternal healthcare services in Pakistan.

The paucity of empirically sound studies on maternal health in Pakistan makes this paper an important contribution to the literature as it attempts to identify the partial effect through which women's health knowledge affects their maternal health-seeking behavior. Community fixed effects and IVs are implemented as separate specifications to control for the possible endogeneity of community-level factors such as infrastructure, access to roads, and the natural environment. Moreover, the analysis relies not only on the use of antenatal care, but also on the frequency, type of delivery, and use of postnatal care as dependent variables. Finally, the dataset used in this study is the PDHS for 2006/07: neither these outcome variables nor the PDHS – which provides a wealth of data – have been used in other studies on maternal health-seeking behavior in Pakistan.

3. Data and Summary Statistics

The PDHS for 2006/07, a nationally representative, cross-sectional dataset, involves two-stage sampling. In the first stage, a total of 1,000 clusters were identified; in the second stage, 105 households were selected from each sampling point. The survey's purpose is to monitor the population and health situation in Pakistan and track its performance in meeting the Millennium Development Goals.

Unlike conventional demographic and health surveys, the PDHS was designed with the primary objective of obtaining data on maternal and neonatal health. It provides a comprehensive picture of marriage, fertility preferences, the use of family planning methods and maternal healthcare use. The data was collected from rural as well as urban areas across the four provinces, making it appropriate for a cross-country analysis. As we have already noted, in spite of the extensive information available, very few fertility studies on Pakistan have employed the PDHS 2006/07.

While the survey questionnaire is designed to gather wide-ranging information at both the household as well as individual level, our analysis is conducted at the individual level. The total sample comprises 10,023 women. The working sample includes married women aged 15–49 who gave birth at least once in the three years prior to the survey.[1] The PDHS gives a broad range of information on each birth; to ensure this data is used accurately, we focus on the most recent births closest to the time of interview. This particular sample comprises 4,475 women, 65 percent of who are from rural areas and 34 percent from urban areas.

Table 1 shows that only 39 percent of Pakistani women visited a medical facility for antenatal care at least three times during their last pregnancy. Just over half (51 percent) received at least two tetanus toxoid injections; 38 percent delivered their child at a health facility or under a health professional's care, and only 24 percent utilized postnatal care. Moreover, there is a pronounced difference in the proportion of women who utilized maternal health services in rural and urban areas: only 29 percent of women in rural areas made at least three antenatal visits during pregnancy as opposed to 56 percent in urban areas.

[1] We restrict the sample to at least one birth in the three years prior to the survey, given that some women might not respond accurately in connection with births before this interval (see Celik & Hotchkiss, 2000).

Table 1: Descriptive statistics: mean and standard deviation for overall Pakistan data

Variable	Mean	SD	Observ.
Outcome variables			
Antenatal care			
At least three antenatal visits during pregnancy (=1)	0.39	0.49	4,418
At least two tetanus toxoid injections during pregnancy (=1)	0.51	0.50	4,406
Safe delivery (=1)	0.38	0.49	4,460
Postnatal care (=1)	0.24	0.43	4,475
Individual characteristics			
Age			
< 25 (=1)	0.28	0.45	4,475
25–34 (=1)	0.52	0.50	4,475
35–49 (=1)	0.20	0.40	4,475
Education			
None or less than primary (=1)	0.71	0.45	4,475
Primary but below middle (=1)	0.09	0.29	4,475
Middle but below secondary (=1)	0.07	0.25	4,475
Secondary and above (=1)	0.13	0.34	4,475
Literacy skills (=1)	0.34	0.47	4,475
Health knowledge (=1)	0.48	0.50	4,461
Mass media exposure			
Heard family planning message on radio or TV in the last month (=1)	0.37	0.48	4,474
Working woman (=1)	0.27	0.44	4,471
Child's birth order			
1 (=1)	0.19	0.39	4,475
2 to 3 (=1)	0.35	0.48	4,475
4 to 6 (=1)	0.31	0.46	4,475
7+ (=1)	0.15	0.36	4,475
Previous fetal loss or stillbirth (=1)	0.22	0.45	4,475
Previous fetal loss or stillbirth * working woman (=1)	0.08	0.26	4,471
Planned pregnancy (=1)	0.74	0.44	4,475
Husband's education			
None or less than primary (=1)	0.41	0.49	4,475
Primary but below middle (=1)	0.11	0.31	4,475
Middle but below secondary (=1)	0.15	0.36	4,475
Secondary and above (=1)	0.32	0.47	4,475
Husband has skilled employment (=1)	0.53	0.50	4,474
Discussed place of delivery with spouse (=1)	0.44	0.50	4,475

Variable	Mean	SD	Observ.
Husband is a blood relation (=1)	0.52	0.50	4,471
Wife of household head (=1)	0.51	0.50	4,474
Household characteristics			
Household wealth (index)			
Low	–1.15	0.33	840
Medium-low	–0.45	0.15	839
Medium	–0.01	0.11	840
Medium-high	0.39	0.14	840
High	1.21	0.66	839
Number of household members	9.96	5.57	4,475
Community-level characteristics			
Place of residence			
Region			
Urban (=1)	0.35	0.48	4,475
Rural (=1)	0.65	0.48	4,475
Province			
Punjab (=1)	0.40	0.49	4,475
Sindh (=1)	0.29	0.45	4,475
KP (=1)	0.20	0.40	4,475
Balochistan (=1)	0.11	0.32	4,475

Note: (=1) represents dummy variable; the mean is a proportion of this variable.
Source: Authors' calculations based on PDHS 2006/07.

The descriptive statistics also show that more than 70 percent of women across Pakistan are uneducated or have less than primary education; only 13 percent reported having received higher education. Of these, 81 percent were from rural areas and 52 percent from urban areas. To assess women's literacy skills, this study uses the results of a literacy test conducted as part of the PDHS to gauge reading ability. Only 24 percent of rural women claimed some level of literacy as against 53 percent in urban areas.

Moreover, the data show that urban women in Pakistan are more likely to discuss matters with their husbands and are, therefore, more empowered than their rural counterparts. Additionally, we use a series of questions asked as part of the PDHS to measure women's awareness of the risks and problems associated with pregnancy. The data show that less than 50 percent of women are aware of such problems. Interestingly, there is no pronounced difference between rural and urban women in terms of health knowledge.

Next, we construct a wealth index comprising household assets and housing conditions using principal component analysis. This allows us to rank individuals on the basis of their "household scores and divide them in different quintiles, each representing 20 percent of the score between 1 (poorest) and 5 (wealthiest)" (Singh et al., 2012).[2] Separate t-tests are conducted to identify any differences in the individual and household characteristics of women residing in rural and urban Pakistan. The results (available on request) indicate that there is no significant difference in the characteristics of rural and urban women.

4. Conceptual Framework and Estimation Strategy

According to Anderson's (1968) behavioral model, a household's medical care practices are based on the interplay of its predisposing, enabling, and need factors (see Figure 1). Health-seeking behavior is, therefore, "a sequential and conditional function of an individual's predisposition to use health services, their perceived need to use them and their ability to obtain these services" (Amin et al., 2010, p. 11). The actual use of healthcare is triggered by need during the prenatal and postnatal stages of pregnancy. However, in the absence of such data, we explore the extent to which predisposing and enabling factors affect maternal health behavior.

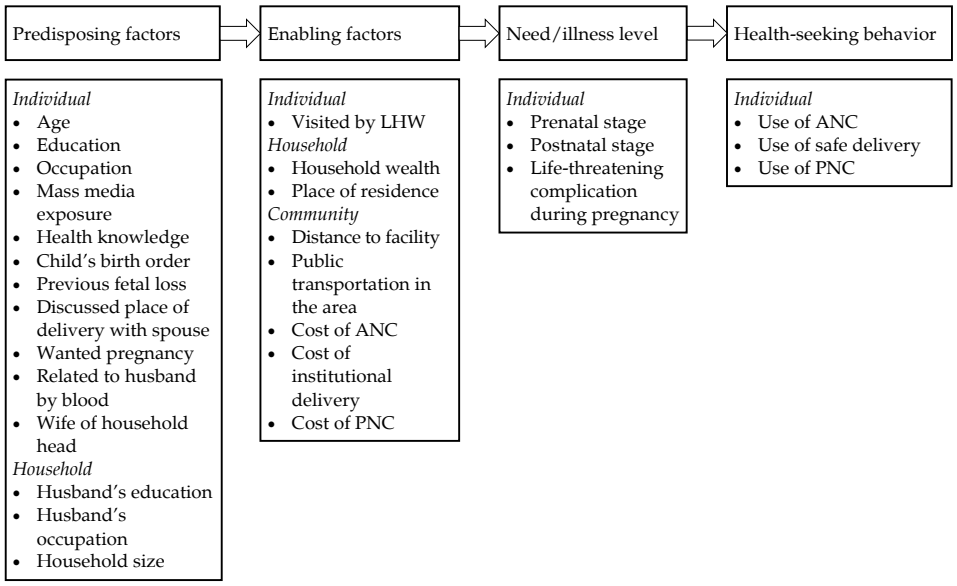
To identify the socioeconomic determinants of maternal healthcare behavior among currently married women in Pakistan, we begin with a simple model:

$$MHB = \beta_0 + \alpha I + \varphi H + \gamma C + \varepsilon \quad (1)$$

where MHB is women's maternal health-seeking behavior, I represents a vector comprising their individual characteristics, H is a vector of household characteristics, and C represents community characteristics.

[2] The wealth index is constructed using the following variables: material used to construct roof, walls and flooring; type of sanitation facilities and cooking fuel available; availability of electricity; ownership status of house; ownership of consumer durables (cooler, air conditioner, refrigerator, bicycle, motorcycle, scooter, car, truck, telephone, washing machine, water pump, sewing machine, computer, bed, chairs, cabinets, sofa, camera).

Figure 1: Conceptual framework for determinants of health-seeking behavior in Pakistan



Source: Amin, Shah, and Becker (2010).

4.1. Description of Variables

MHB is the variable of interest, reflecting women's healthcare use during pregnancy. Under WHO's (2006) recommendations, the following components, when combined, constitute complete maternal healthcare (Table 2). Antenatal care is not complete unless women are protected from unhygienic practices and other risks via tetanus toxoid injections. The number of visits to a healthcare facility is also an important factor: by frequently visiting health facilities, women come into direct contact with health professionals, with whom they develop a rapport. Together, these components constitute complete antenatal care.

Table 2: List of dependent variables under MHB

Antenatal care	Dummy variable = 1 if woman has had at least three antenatal visits; = 0 otherwise.
	Dummy variable = 1 if woman has had at least two tetanus toxoid injections; = 0 otherwise.
Safe delivery	Dummy variable = 1 if delivery took place at a health facility or at home by a doctor, nurse, lady health visitor, auxiliary nurse, midwife, or other health professional; = 0 otherwise.
Postnatal care	Dummy variable = 1 if trained postnatal care was obtained within 42 days of delivery; = 0 otherwise.

4.2. Endogeneity and Other Specification Issues

Simple OLS estimation can result in biased estimates due to the feedback effect between certain individual characteristics and women's decision to seek maternal healthcare, resulting in an endogeneity problem. Unobservable community-level characteristics can also result in biased estimates.

4.2.1. Women's Education and Maternal Healthcare Behavior

While the positive association between women's education and their health-seeking behavior is largely undisputed, the mechanism through which this relationship works has not been studied in detail. Apart from the theoretical evidence, the problem is largely methodological.

Equation (1) assumes that women's education has a direct effect on their maternal health-seeking behavior. Schooling can influence women's health behavior by improving their ability to process information efficiently through the cognitive skills (literacy or numeracy) they learn at school. Conversely, the acquisition of health knowledge is not restricted to the period women are enrolled in school – the literacy and numeracy skills they acquire during this time can increase women's health knowledge even after leaving school (Thomas et al., 1991; Glewwe, 1999; Aslam & Kingdon, 2012). This study captures both the direct and indirect effect by adding the following pathways of education as control variables:

- Education → literacy skills → maternal health behavior
- Education → literacy skills → health knowledge → maternal health behavior

Literacy skills acquired at school enable women to assess and assimilate information successfully, and increase their health knowledge, which affects their health-seeking behavior (Glewwe, 1999). Maternal health knowledge is itself a potentially endogenous variable. While health knowledge helps identify the need to avail maternal health services, women who seek healthcare are likely to have greater health knowledge. Thus, the causality runs in both directions. To control for endogeneity, we use the IV technique where exposure to media is the instrument.

For women, an important source of information and health knowledge is their exposure to mass media (see Thomas et al., 1991; Glewwe, 1999; LeVine et al., 2004; Aslam & Kingdon, 2012). We use information received through family planning messages broadcasted on radio or television in the last month as an instrument for health knowledge. The PDHS provides information on households' ownership of a radio or television, along with the type of health message delivered to women through these media. This study considers a woman having been exposed to mass media only if she reports having "heard a family planning message on radio or television last month."

We assume that this particular measure of mass media increases awareness among women, improves their health knowledge, and affects their health-seeking behavior.[3] The instrument is informative because listening to a family planning message on the radio or television is unlikely to affect women's health-seeking behavior through any other mechanism but increased health knowledge. Moreover, it is highly improbable that women would listen to family planning messages on the radio or television because they had received maternal healthcare. This makes mass media exposure a valid instrument

4.2.2. Omitted Variable Problem

Short-run fluctuations in a household's resources, represented by its income or income per capita, are an important determinant of the ability and willingness to pay for healthcare services. Following the pattern of the USAID-sponsored demographic and health surveys, the PDHS 2006/07 does not have any information on household income, but does provide extensive data on ownership of household assets.

[3] The instrument is well established in the literature. While there is a strong correlation between owning a television and listening to a health message (see footnote 4), the correlation is weaker for owning a radio. This strengthens the case for listening to a health message resulting in increased health knowledge as opposed to merely owning a television.

We develop a wealth index based on household ownership of durable assets. It is important to note that ownership of a radio or television is not included in the index. This is because the data show there is a strong correlation between households that own either a radio or television and women who have heard a family planning message on radio or television.[4] Including these consumer durables in the wealth index would thus decrease the IV's explanatory power.

We also use the level of education attained by women's spouses and their occupation as independent variables. These covariates closely reflect spouses' earnings and control for the relative socioeconomic status of a household.

Although community-level covariates such as the quality of local health infrastructure cannot be included in the model (due to data unavailability), they are important determinants of healthcare use and can result in biased coefficients unless controlled for. Elo (1992) notes that better-educated women might belong to a particular community that has more schools, for instance. This can confound the relationship between women's education and their health-seeking behavior. To eliminate the omitted variable bias caused by community characteristics, we estimate a cluster fixed effects model. Fixed effects at a smaller level eliminate all the characteristics common to women in a single cluster, thus avoiding omitted variable bias.

4.3. Estimation Strategy

Given that the predicted probabilities of the outcome variables are bound between 0 and 1, we use a probit model to assess the impact of socioeconomic factors on the uptake of maternal health services. Since health knowledge is potentially endogenous, the model is estimated using the IV technique. The first stage of the two-stage least squares (2SLS) model involves a probit model to predict the probability of health knowledge. The second stage is an ordinary least squares (OLS) model.

Stage 1 is represented by the following equation:

$$Health\ knowledge_i = \psi + \Sigma\alpha I + \Sigma\varphi H + \Sigma\gamma C + \lambda mass\ media\ exposure_i + \varepsilon \quad (2)$$

[4] Ninety percent of women from households that owned a television reported listening to a family planning message in the last month (PDHS 2006/07). Forty percent of women from households that owned a radio reported listening to a family planning message in the last month (PDHS 2006/07).

Stage 2 is represented by the following equation:

$$MHB_i = \beta + \Sigma\alpha \mathrm{I} + \varphi_i health\ \hat{k}nowledge_i + \Sigma\varphi \mathrm{H} + \Sigma\gamma \mathrm{C} + \varepsilon \quad (3)$$

Vector *I* captures individual-level characteristics; the household's environment is captured by vector *H*. *C* represents community characteristics, health knowledge (measured by women's awareness of the risks and complications of pregnancy) is the endogenous variable, and mass media exposure is the IV. This selection of variables is drawn from the choice of variables in the literature and the corresponding data available in the PDHS 2006/07.

In addition, we estimate the following fixed effects logit model:

$$\mathrm{MHB} = \beta + \Sigma\alpha \mathrm{I} + \Sigma\varphi \mathrm{H} + \theta_c + \varepsilon \quad (4)$$

Equation (4) represents fixed effects at the cluster level (the primary sampling unit). This model controls for the distance to a health facility and the quality of local health infrastructure as well as other unobservable heterogeneity within sampling units, which cannot be controlled for by the covariates included in the analysis. The variable θ_c captures the unobserved heterogeneity constant across communities, that is, all unobserved factors, constant among sampling units, that affect maternal health-seeking behavior. The IV technique is also implemented in the fixed effects logit model and the predicted values of health knowledge used in the estimation.

5. Results and Empirical Findings

The econometric specification we follow uses all the possible variables given in Figure 1 that could affect women's maternal health-seeking behavior in Pakistan.

5.1. First-Stage Results

In the first stage of the two-step linear probability model (LPM), the endogenous covariate is regressed on the IV using the probit estimation technique (see Table A1 in the Appendix). Note that this first stage remains the same for all the dependent variables mentioned in the previous section.

To establish that mass media exposure is an informative instrument, we carry out an Angrist-Prischke F-test. The first-stage F-statistic value is 25.18, which is greater than 10, allowing us to reject the null hypothesis (i.e., that the IV has no explanatory power). Moreover, the significant coefficient

of the IV in the first-stage regression indicates that mass media exposure strongly influences women's health knowledge. It is important to note that the programs disseminating information on family planning are public service programs with nationwide outreach. Along with private channels, they are also broadcasted on national channels, irrespective of the type of area or village to which the target audience might belong. This makes mass media exposure an exogenous variable.

The second stage, based on the OLS method, uses the predicted endogenous covariate, health knowledge, obtained from the first stage as an explanatory variable, along with other individual and household-level characteristics to identify which factors determine women's maternal healthcare use. The estimations are conducted using data for Pakistan overall, controlling for regional and provincial differences among the three provinces of Punjab, Sindh, and Khyber Pakhtunkhwa (KP). Further, to control for community-specific factors such as the quality of local health infrastructure, we employ cluster fixed effects. In all cases, we control for heteroskedasticity of unknown form by implementing robust standard errors at the cluster level.

The explanatory variables are classified as individual characteristics, household characteristics, and community characteristics. Women's individual characteristics, their household characteristics, and community characteristics are regressed separately on four binary dependent variables: (i) made at least three antenatal visits to a healthcare facility (yes = 1, no = 0), (ii) received at least two tetanus toxoid inoculations (yes = 1, no = 0), (iii) had a safe delivery (yes = 1, no = 0), and (iv) received postnatal care (yes = 1, no = 0).

5.2. Second-Stage Results

The results for the second stage of the IV probit model are discussed below. Table 3 reports the estimated parameters of the data for Pakistan overall for each outcome variable. The model also addresses the endogeneity problem.

Women's own characteristics include their age categorized into age cohorts. Column 1 suggests that women aged 35–49 have more maternal experience, but also undergo a riskier pregnancy and, therefore, have a higher probability of receiving antenatal care than women under the age of 25. Similarly, women aged 35–49 have a greater probability of receiving at least two tetanus inoculations during pregnancy, safe delivery care, and postnatal

care compared to women under 25, given their older age and the higher risks associated with it. This effect reflects the findings of Elo (1992) who establishes that maternal healthcare use is higher among older women in Peru.

The coefficients for different categories of women's educational attainment show that women with middle and higher education are more likely to visit a healthcare facility seeking antenatal care at least three times during pregnancy compared to uneducated women. Interestingly, women who have received a formal education, but not completed middle school, also have a greater probability of making at least three antenatal visits. These results remain consistent for other aspects of maternal health-seeking behavior, such as tetanus toxoid inoculations, safe delivery, and postnatal care. This implies that all levels of education have a significantly positive effect on women's maternal health-seeking behavior (see Elo, 1992; Amin et al., 2010; Singh et al., 2012).

Table 3: LPM results for women's maternal healthcare use behavior

	Antenatal care		Safe delivery	Postnatal care
Explanatory variable	**(1)**	**(2)**	**(3)**	**(4)**
Individual char.				
Age (years)				
< 25 (ref.)				
25–34	0.026	-0.013	0.027	0.025
	(0.019)	(0.020)	(0.019)	(0.017)
35–49	0.102***	0.074***	0.114***	0.058**
	(0.027)	(0.0292)	(0.025)	(0.021)
Education				
None or less than primary (ref.)				
Primary but below middle	0.133***	0.176***	0.114***	0.065***
	(0.028)	(0.028)	(0.027)	(0.024)
Middle but below secondary	0.184***	0.199***	0.165***	0.109***
	(0.030)	(0.029)	(0.031)	(0.029)
Secondary and above	0.194***	0.153***	0.243***	0.174***
	(0.029)	(0.029)	(0.028)	(0.028)
Health knowledge [a]	1.254***	1.487***	0.522***	0.483***
	(0.175)	(0.188)	(0.176)	(0.161)
Working woman	-0.192***	-0.230***	-0.116***	-0.095***
	(0.022)	(0.033)	(0.030)	(0.027)
Child's birth order				
1 (reference)				

	Antenatal care		Safe delivery	Postnatal care
Explanatory variable	**(1)**	**(2)**	**(3)**	**(4)**
2 to 3	-0.140***	-0.089***	-0.092***	-0.068***
	(0.022)	(0.022)	(0.022)	(0.020)
4 to 6	-0.181***	-0.141***	-0.160***	-0.101***
	(0.027)	(0.028)	(0.027)	(0.024)
7+	-0.278***	-0.249***	-0.185***	-0.133***
	(0.036)	(0.038)	(0.037)	(0.031)
Previous fetal loss or stillbirth	-0.102***	-0.142***	-0.036	-0.031
	(0.026)	(0.028)	(0.027)	(0.0251)
Previous fetal loss or stillbirth * working woman	0.110***	0.065*	0.062*	0.019
	(0.034)	(0.041)	(0.036)	(0.032)
Wanted pregnancy	0.026	0.108***	0.040**	0.055***
	(0.021)	(0.022)	(0.021)	(0.019)
Husband's education				
None or less than primary (ref.)				
Primary but below middle	-0.020	-0.002	0.035	0.008
	(0.024)	(0.027)	(0.024)	(0.020)
Middle but below secondary	0.046**	0.057**	0.038*	0.017
	(0.023)	(0.024)	(0.022)	(0.019)
Secondary and above	0.080***	0.077***	0.084***	0.077***
	(0.020)	(0.022)	(0.020)	(0.017)
Husband has skilled employment	0.073***	0.044**	0.003	0.021
	(0.016)	(0.018)	(0.016)	(0.014)
Discussed place of delivery with spouse	0.060**	-0.017	0.119***	0.100***
	(0.024)	(0.026)	(0.023)	(0.021)
Husband is a blood relation	-0.053***	-0.021	-0.015	-0.001
	(0.015)	(0.016)	(0.014)	(0.013)
Wife of household head	-0.035**	-0.063***	-0.045***	-0.038**
	(0.017)	(0.018)	(0.017)	(0.015)
Household char.				
Household wealth (index)	0.043***	0.015	0.055***	0.037***
	(0.009)	(0.011)	(0.010)	(0.008)
Number of household members	-0.003	-0.002	-0.003	-0.002
	(0.002)	(0.002)	(0.002)	(0.001)
Community char.				
Place of residence				
Region				
Urban (ref.)				
Rural	-0.081***	-0.034*	-0.105***	-0.080***
	(0.019)	(0.021)	(0.021)	(0.018)

	Antenatal care		Safe delivery	Postnatal care
Explanatory variable	**(1)**	**(2)**	**(3)**	**(4)**
Province				
Punjab (ref.)				
Sindh	-0.242***	-0.425***	-0.022	-0.017
	(0.049)	(0.053)	(0.051)	(0.046)
KP	-0.019	-0.012	0.047*	-0.032
	(0.020)	(0.026)	(0.025)	(0.019)
Constant	-0.007	0.030	0.190***	0.033
Number of observations	4,133	4,125	4,172	4,186
R-squared	0.241	0.148	0.228	0.200

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. Robust standard errors at cluster level are given in parentheses below estimates.
Col. 1 = min. three antenatal visits to health facility, col. 2 = received at least two tetanus toxoid injections, col. 3 = gave birth at health facility/by trained health service providers, col. 4 = received trained postnatal care.
a = These are the predicted values of the health knowledge variable, obtained from the first stage of the IV probit model.
Source: Authors' calculations.

As mentioned in Section 4, women's education has an indirect effect on their maternal health-seeking behavior. Formal schooling enables women to assess and assimilate information more efficiently, which increases their health knowledge and thus affects the outcome variable. Health knowledge itself is, therefore, an important explanatory variable of health-seeking behavior.

By controlling for education, this study intends to isolate the impact of women's health knowledge on their health-seeking behavior. The positive and statistically significant coefficient of the health knowledge variable for all outcome variables supports this hypothesis, implying that women who are more aware of the issues and complications associated with pregnancy have a higher probability of seeking maternal healthcare (see columns 1–4 in Table 3). It is interesting to note that health knowledge has a more pronounced effect on complete antenatal care use than safe delivery and postnatal care.

The literature has established that women's employment status is associated with their empowerment and better healthcare-seeking behavior. Contrary to other studies, our results show that working women have a smaller probability of seeking antenatal care than women who are not working. This could be due to the former's financial status and nature. Work

status may be picking up the effect of other socioeconomic characteristics of working women, for example, the combined effect of the household's financial standing, the nature of the woman's job, and the extent to which she is involved in intra-household decision making.

Table 1 shows that approximately 27 percent of women in the total sample are working, 79.5 percent of who are illiterate. Such low levels of education translate into lower earnings for these women. Moreover, of all the women who are working, 38 percent belong to the least wealthy households and only 7 percent belong to the wealthiest households (see Table A2). These statistics show that most working women fall within the lower income strata of the sample. Table A3 reiterates this by showing that, of the 27 percent of women who are working, only 14 percent have a skilled job while 86 percent work as low-paid, unskilled workers. The estimations, therefore, pick up the effect of working women with lower earnings who belong to poor households and cannot afford to seek healthcare.

In accord with the literature (see Elo, 1992; Celik & Hotchkiss, 2000), the negative coefficients for children's birth order show that women expecting their first child have a greater probability of paying at least three visits to seek antenatal care compared to those at a higher birth order. Interestingly, this effect increases for all components of maternal healthcare as birth order increases. This suggests that women with more children rely on their experience and health knowledge from previous births, and may have less time and resources available to use maternal care for subsequent pregnancies.

Contrary to other findings on maternal health-seeking behavior, our results indicate that women who have experienced a fetal loss or stillbirth have less likelihood of seeking antenatal care, tetanus inoculations, and postnatal care compared to women with no maternal history. Given the unexpected sign of the result, we investigate the interaction of the variable with women's working status. The estimated parameters reported in column 3 show that whether a woman has a history of fetal loss or stillbirth does not have any effect on her probability of seeking safe delivery care.

However, when this variable interacts with the working women variable, the coefficient becomes positive and statistically significant for antenatal visits, tetanus inoculations, and safe delivery. The interaction term is constructed to gauge the impact of maternal history along with the household's socioeconomic status on the outcome variables. These results indicate that the likelihood of a woman visiting a health facility to seek antenatal care at least three times during pregnancy, of receiving tetanus

inoculations, and of utilizing safe delivery care is higher if she is a working woman and has experienced fetal loss or stillbirth, keeping all other factors constant.

The literature suggests that women going through a planned pregnancy are more cautious and tend to attach greater importance to the child expected. The results for the variable planned pregnancy support the literature: it has a positive and significant effect on tetanus inoculations and use of safe delivery and postnatal care by women. This implies that a woman facing a planned pregnancy is more cautious and, therefore, has a higher probability of receiving maternal healthcare compared to a woman going through an unexpected pregnancy (see Ahmed & Mosley, 2002; Sepehri et al., 2008).

The level of education attained by a woman's husband is hypothesized to reflect the household's economic wellbeing as it translates into higher earnings. At the same time, the husband's education reflects his perceptions and preferences with respect to modern medicine. The coefficient of the spouse's primary education is statistically insignificant for all the outcome variables, indicating that primary education alone is not enough to ensure higher earnings or modified attitudes toward maternal healthcare. However, women whose spouses have completed at least middle or higher schooling are more likely to seek maternal healthcare than women with illiterate spouses. These results are consistent with the literature, which argues that a higher level of spousal education translates into greater household income and increases women's probability of seeking maternal healthcare.

Another proxy for household economic wellbeing is whether a woman's spouse has skilled employment. The effect of this variable is also consistent with the literature: it shows that the probability of seeking antenatal care and receiving tetanus inoculations and postnatal care is higher for women whose spouses have skilled employment compared to those whose spouses have unskilled jobs. However, our results indicate that skilled employment in this context has no effect on women's likelihood of receiving safe delivery and postnatal care.

This study uses spousal discussion of the place of delivery as a proxy for women's involvement in the decision-making process. A woman's ability to make important decisions and influence her personal environment emerges as a strong determinant of maternal health behavior in the literature (see Furuta & Salway, 2006; Mumtaz & Salway, 2007; Hou & Ma, 2011). In Pakistan, however, where family structures are usually complex and most

women live in a joint family system, a woman's ability to make independent decisions is not an adequate measure of her autonomy. The variable spousal discussion is, therefore, a viable proxy for women's involvement in the decision-making process.

Our results show spousal discussion has a positive and significant effect on the likelihood of making at least three antenatal visits and seeking safe delivery and postnatal care. This implies that women who discuss such decisions with their spouse have a higher probability of seeking maternal healthcare, after controlling for all other individual and household characteristics (see Furuta & Salway, 2006). Conversely, spousal discussion concerning the place of delivery does not influence women's decision to get at least two tetanus inoculations.

We also include the variable "wife of household head" to see if this has any effect on women's health-seeking behavior. Contrary to expectations, a woman who is the household head's wife has less probability of visiting a healthcare facility at least three times during pregnancy. The effect of this variable remains the same for tetanus inoculations, safe delivery, and postnatal care. Consanguineous marriages are very common in Pakistan and 52 percent of women in the working sample are married to their cousins. However, as the results in Table 4 show, controlling for other factors, consanguinity does not influence any outcome variable.

Household wealth and the number of household members are included in the model to capture household wellbeing. A wealth index comprising household conditions and ownership of durable assets is created using principal component analysis. The coefficient shows that, ceteris paribus, women from wealthier households have a greater probability of receiving maternal healthcare (see, for instance, Celik & Hotchkiss, 2000; Shariff & Singh, 2002; McTavish, Moore, Harper, & Lynch, 2010).

The coefficients for the number of household members in relation to making at least three antenatal visits and safe delivery care are negative, implying that being part of a larger household has a strong adverse impact on women's antenatal care and safe delivery care utilization. This finding is in accord with the literature, which suggests that women from larger households have fewer resources at their disposal and are subject to more congestion and thinly stretched scarce resources compared to women in smaller households (see Shariff & Singh, 2002; Mumtaz & Salway, 2007; Singh et al., 2012).

However, the size of a household does not influence the probability of a woman receiving tetanus inoculations. This is because, unlike other maternal health-seeking practices, tetanus inoculations do not necessarily involve mobility or incur any cost. Women visited by lady health workers are more likely to receive tetanus inoculations than those who are not. Unfortunately, there is not enough data in the PDHS to investigate behavioral differences in maternal health seeking caused by services delivered by lady health workers.

The results in Table 3 show that women living in rural areas are less likely to receive maternal healthcare than their urban counterparts. This is not surprising: urban areas have greater access to healthcare facilities than rural areas. However, there is no significant difference between rural and urban women's probability of receiving at least two tetanus inoculations. An interaction term is created for each variable that is statistically different between rural and urban areas (e.g., planned pregnancy) with the rural dummy variable. The effect of these interaction terms is insignificant for all the dependent variables and is not, therefore, included in the analysis.

At the provincial level, women in Sindh have a smaller probability of receiving complete antenatal care than women in Punjab. Fewer women in KP use safe delivery care compared to women in Punjab, after controlling for all other factors. Interestingly, there is no significant variation between women in Punjab and KP in terms of receiving complete antenatal and postnatal care.

5.3. Community Fixed Effects

The socioeconomic conditions of an area, cultural factors, and community-specific characteristics – such as the distance to the nearest health facility, the availability of public transport, and the quality of local health infrastructure – also affect the variable of interest and outcome variable. However, based on the availability of factors in the PDHS, these characteristics cannot be included in the analysis.

There is growing evidence in the literature that community-specific characteristics, such as the number of schools in a community, may affect the level of education attained by women as well as by their spouses. This is either because better-educated men and women belong to regions with better socioeconomic conditions or because educated people are more likely to migrate to areas with better economic opportunities.

To address this issue of omitted variable bias and isolate the impact of education, we employ community fixed effects at the cluster level in a

separate regression analysis involving the IV technique as well. On average, there are about 10 to 15 households in a primary sampling unit. Households within a primary sampling unit are located in the same vicinity so that observable and unobservable characteristics can be taken into account in the fixed effects model.

Table 4 provides fixed effects estimates at the cluster level for women's maternal health-seeking behavior. For all the dependent variables, the effect of all levels of women's education generally remains significant. However, there is a substantial decline in coefficient size, indicating that cluster-specific characteristics affect women's education in the IV probit model. In terms of the effect of the husband's education on women's maternal health-seeking behavior, the effect of all levels of education, except secondary and higher education, become insignificant once community-specific characteristics are controlled for.

The fixed effects model also indicates that, prior to controlling for cluster-specific characteristics, the coefficient of health knowledge is attenuated. Table 4 shows that, while the effect of women's health knowledge on their maternal health-seeking behavior remains significant, the magnitude of this influence has declined.

Table 4 also shows that, once we control for heterogeneity within a sampling unit, there is no difference between the maternal health-seeking behavior of older and younger women, except in using safe delivery care. Similarly, women's maternal history does not influence their maternal healthcare use. The probability of women seeking safe delivery care is not affected by whether their pregnancy is planned or mistimed. This implies that the effect of planned pregnancy on women's use of safe delivery care is indeed confounded by area-specific characteristics. Once these characteristics are controlled for, women are inclined to seek maternal healthcare services irrespective of whether their pregnancy is planned or unplanned, due to the risks associated with childbirth.

Another key result of the fixed effects model is that the heterogeneity within sampling units seems to have the largest confounding effect on tetanus inoculations received by pregnant women in Pakistan. The results of cluster fixed effects show that women's age, primary schooling or employment status, previous fetal loss or stillbirth, and spouse's employment status do not influence their probability of receiving tetanus inoculations.

Table 4: Cluster fixed effects for women's maternal healthcare use behavior

	Antenatal care		Safe delivery	Postnatal care
Explanatory variable	**(1)**	**(2)**	**(3)**	**(4)**
Individual char.				
Age (years)				
< 25 (ref.)				
25–34	0.00897	-0.0110	0.00725	0.0144
	(0.0279)	(0.0308)	(0.0232)	(0.0207)
35–49	0.0521	0.0167	0.0779**	0.0363
	(0.0376)	(0.0413)	(0.0313)	(0.0281)
Education				
None or less than primary (ref.)				
Primary but below middle	0.0920***	0.0639	0.0802***	0.0464*
	(0.0357)	(0.0395)	(0.0296)	(0.0265)
Middle but below secondary	0.0952**	0.104**	0.144***	0.0802***
	(0.0407)	(0.0450)	(0.0340)	(0.0304)
Secondary and above	0.0794*	0.0800*	0.163***	0.103***
	(0.0417)	(0.0453)	(0.0341)	(0.0304)
Health knowledge	0.812***	0.942***	0.388*	0.378**
	(0.257)	(0.287)	(0.212)	(0.189)
Working woman	-0.0639**	-0.0518	-0.0663***	-0.0630***
	(0.0292)	(0.0317)	(0.0238)	(0.0213)
Child's birth order				
1 (reference)				
2 to 3	-0.104***	-0.0700**	-0.0736***	-0.0602***
	(0.0276)	(0.0304)	(0.0229)	(0.0205)
4 to 6	-0.166***	-0.139***	-0.156***	-0.0941***
	(0.0348)	(0.0387)	(0.0291)	(0.0260)
7+	-0.218***	-0.194***	-0.138***	-0.0998***
	(0.0454)	(0.0500)	(0.0378)	(0.0337)
Previous fetal loss or stillbirth	-0.0379	-0.0428	-0.0116	-0.0105
	(0.0313)	(0.0345)	(0.0262)	(0.0235)
Previous fetal loss or stillbirth * working woman	0.0748	0.00330	0.0517	-0.00291
	(0.0504)	(0.0557)	(0.0418)	(0.0375)
Wanted pregnancy	-0.0160	0.0696*	0.0303	0.0421**
	(0.0240)	(0.0271)	(0.0202)	(0.0179)
Husband's education				
None or less than primary (ref.)				
Primary but below middle	-0.0577*	-0.0258	0.00177	-0.00683
	(0.0333)	(0.0362)	(0.0274)	(0.0246)
Middle but below secondary	0.0263	0.0208	0.0214	0.0104
	(0.0311)	(0.0350)	(0.0261)	(0.0233)
Secondary and above	0.0650**	0.0609**	0.0791***	0.0929***

	Antenatal care		Safe delivery	Postnatal care
Explanatory variable	**(1)**	**(2)**	**(3)**	**(4)**
	(0.0274)	(0.0303)	(0.0228)	(0.0204)
Husband has skilled employment	0.0390*	0.00171	-0.0179	0.00329
	(0.0221)	(0.0245)	(0.0182)	(0.0163)
Discussed place of delivery with spouse	0.0944**	0.0147	0.121***	0.108***
	(0.0281)	(0.0312)	(0.0229)	(0.0203)
Husband is a blood relation	-0.0116	-0.0242	-0.0149	-0.0197
	(0.0189)	(0.0209)	(0.0158)	(0.0141)
Wife of household head	-0.00425	-0.0125	-0.0416**	-0.0333**
	(0.0226)	(0.0248)	(0.0187)	(0.0167)
Household char.				
Household wealth (index)	0.0314**	0.0171	0.0328***	0.0.235**
	(0.0135)	(0.0150)	(0.0113)	(0.00998)
Number of household members	-0.00108	-0.00357	-0.00164	-0.00192
	(0.00215)	(0.00238)	(0.00179)	(0.00161)
Number of observations	4,054	4,046	4,094	4,108
Adjusted R-squared	-0.778	-1.080	-0.318	-0.319

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01. Robust standard errors at cluster level are given in parentheses below estimates.
Col. 1 = min. three antenatal visits to health facility, col. 2 = received at least two tetanus toxoid injections, col. 3 = gave birth at health facility/by trained health service providers, col. 4 = received trained postnatal care.
Source: Authors' calculations.

5.4. Additional Robustness Checks

In order to verify the results obtained from the cross-sectional and fixed effects models for overall Pakistan data, we conduct a series of robustness checks. An IV probit model for the two-stage LPM with district fixed effects is applied to verify the findings of the cluster fixed effects model. The results of both are consistent with the primary models. Additional robustness checks include separate regressions for the provinces of Punjab, Sindh, and KP, and separate regressions for rural and urban areas.[5]

6. Conclusion

This study has attempted to identify the socioeconomic determinants of women's maternal health-seeking behavior in Pakistan, using the IV approach. Our results show that the level of education attained by a women and her spouse, her health knowledge, and her children's birth order are particularly important in determining whether she will seek maternal

[5] All these results are available on request.

healthcare. The results of both the LPM as well as the fixed effects model confirm that formal schooling significantly influences women's maternal health-seeking behavior.

These effects of education are not, however, uniform across different levels of women's education, the net effect being highest for women who have completed secondary or higher education. Interestingly, we find that women with any level of formal schooling (even up to primary school) are more likely to seek maternal healthcare, thus reiterating the importance of education. On the other hand, women whose spouses have been educated up to the middle or higher level are more likely to seek healthcare than those whose husbands are less educated. This implies that a lower level of education among men is not sufficient to transform their attitudes toward seeking formal healthcare for their spouses.

An important finding is that health knowledge has a partial, albeit strong, effect on women's health-seeking behavior even after controlling for education. This implies that, while formal education can directly enhance women's health knowledge and enable them to access and process knowledge, other sources of information on health beyond those taught in school – such as radio, television, newspapers, and other instruments of mass media – can also effectively enhance their health knowledge.

The results also confirm that health knowledge can be acquired at any stage in life. Information on maternal healthcare broadcasted to the public – particularly women of childbearing age – through mass media public service programs can help increase women's awareness of maternal healthcare as well as their desire to learn how to better handle maternity. This, in turn, encourages them to actively seek assistance from healthcare centers.

Moreover, according to our data, working women belong to less affluent households where their participation in the workforce may not be a personal decision reflecting their empowerment as much as a means of survival. This implies that, in a society characterized by complex family structures, women's empowerment is reflected better by their involvement in decision-making. Our results for spousal discussion of the place of delivery support this argument.

Overall, education increases women's knowledge, capabilities, and self-confidence, all of which are also empowering. In turn, women's increased self-awareness modifies the traditional balance of power in family structures and helps women assume greater responsibility for their health-seeking behavior.

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Appendix

Table A1: First-stage regression results of health knowledge (endogenous covariate)

Explanatory variables	Coefficient
Instrumental variable	
Mass media exposure	
Heard a family planning message on radio or TV in the last month	0.256***
	(0.051)
Individual characteristics	
Age (years)	
< 25 (base case)	
25–34	0.054
	(0.057)
35–49	-0.075
	(0.81)
Education	
None or less than primary (base case)	
Primary but below middle	-0.033
	(0.081)
Middle but below secondary	-0.023
	(0.090)
Secondary and above	0.091
	(0.080)
Working woman	0.368***
	(0.059)
Child's birth order	
1 (base case)	
2 to 3	0.104*
	(0.060)
4 to 6	0.157**
	(0.074)
7+	0.288***
	(0.097)
Previous fetal loss or stillbirth	0.319***
	(0.062)
Previous fetal loss or stillbirth * working woman	-0.194*
	(0.107)
Planned pregnancy	-0.171***
	(0.051)

Explanatory variables	**Coefficient**
Husband's education	
None or less than primary (base case)	
Primary but below middle	0.028
	(0.071)
Middle but below secondary	0.068
	(0.066)
Secondary and above	0.029
	(0.060)
Husband has skilled employment	-0.107**
	(0.046)
Discussed place of delivery with spouse	0.242***
	(0.046)
Husband is a blood relation	0.080*
	(0.044)
Wife of household head	0.055
	(0.050)
Household characteristics	
Household wealth (index)	-0.053*
	(0.030)
Number of household members	0.002
	(0.005)
Community characteristics	
Place of residence	
Region	
Urban (reference)	
Rural	-0.017
	(0.070)
Punjab (reference)	
Sindh	0.727***
	(0.072)
KP	-0.041
	(0.090)
Constant	0.684***
	(0.122)
Number of observations	4,174

Notes: * p < 0.10, ** p < 0.05, *** p < 0.01.
Robust standard errors at cluster level are given in parentheses below estimates.
Source: Authors' calculations based on PDHS 2006/07 data.

Table A2: Proportion of working women, by socioeconomic status

	Women working		Women not working	
Wealth	**Number**	**Percentage**	**Number**	**Percentage**
Low	338	38	502	17
Medium low	250	25	587	20
Medium	247	17	593	20
Medium high	181	12	659	21
High	127	7	709	21

Source: Authors' calculations based on PDHS 2006/07 data.

Table A3: Working women, by employment type

Employment type	**Number**	**Percentage**
Skilled work	609	13.62
Unskilled work	3,862	86.38
Total	4,471	100.00

Source: Authors' calculations based on PDHS 2006/07 data.

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Is There an Arms Race Between Pakistan and India? An Application of GMM

Muhammad Ramzan Sheikh* **and Muhammad Aslam****

Abstract

This study employs the Richardson model to investigate the presence of an arms race between Pakistan and India during the period 1972–2010. Using the generalized method of moments approach, we find that the grievance term for the Pakistan model is positive while that for India is negative. Both countries' defense spending in the previous period is negatively related to the change in their own defense spending due to the economic or administrative incidence of an arms race. Moreover, the defense or reaction coefficients in the specified model determine the presence of an arms race between the two countries. The signs of these coefficients are positive in accord with the classical Richardson model, suggesting that an arms race does indeed exist between Pakistan and India.

Keywords: Arms race, defense spending, generalized method of moments, grievance term, reaction coefficients, Pakistan, India.

JEL classification: C45, H56.

1. Introduction

Countries allocate their defense budgets keeping in view several considerations. First, the resources spent on defense could be utilized for other purposes, such as education, health, infrastructure, or social welfare. Second, excess defense spending can hinder economic growth by diverting resources or investment away from potentially more productive uses. Third, there are consequences for regional security: high defense spending and arms acquisition in one country may provoke a similar response from its neighbors and rivals. Even neighbors with no particular fear of attack may be pressurized by their defense establishment to match new technology for reasons of global prestige. Such pressures can lead to regional arms races.

* Lecturer, School of Economics, Bahauddin Zakariya University, Multan, Pakistan.
** Assistant Professor, Department of Statistics, Bahauddin Zakariya University, Multan, Pakistan.

Such concerns have raised the issue of defense spending and arms races among academics and policymakers. The global arms race is the focus of considerable campaigning, tactical and legislative attention, and academic study (see, for example, Anderton, 1989; Andreou & Zombanakis, 2010; Dalton & Tandler, 2012; Dunne, Nikolaidou, & Smith, 2005; Kollias & Paleologou, 2002; Mohammed, 1992; Öcal, 2003; Tahir, 1995; Ward, 1984). While it is an important function of the state to provide and maintain peace in the country by enhancing its defense capabilities in order to safeguard national interests, the question is what budget the government should allocate to arms acquisition.

The international relations literature lays out the phenomenon of the arms race in the context of security dilemmas. An arms race is considered the competition between two or more entities to accumulate weapons, armed forces, advanced military technology, and military might. It is the competitive, resource-constrained, dynamic process of interaction between two states or coalitions of states in their acquisition of weapons (Brito & Intriligator, 1995).

The arms-race issue has great importance for developing countries such as Pakistan and India. Both allocate an ample share of their budgets to defense, given their internal and external security threats. Over the years, the Indo-Pakistan arms race has become an important area of research (see Öcal, 2003; Phadke, 1988; Yildirim & Öcal, 2006). Both countries have nuclear capabilities with vital geopolitical and strategic positions, which, arguably, is a form of deterrence to both rivals. This makes it very important to investigate the arms race between two countries that also face very large budget deficits and considerable poverty.

While Sheikh and Chaudhry (2013) investigate the overall determinants of defense expenditure in India and Pakistan (including its economic, political, strategic, military, moral, and psychological aspects), this paper focuses on the military angle under the binary Richardson model. Section 2 describes the classical Richardson model of arms races. Section 3 presents an empirical review of arms-race studies on Pakistan and India. Section 4 presents our methodology and specification of the Richardson arms-race approach. Section 5 discusses the model's results and Section 6 concludes the paper.

2. The Richardson Arms Race Approach

Richardson developed a mathematical model of the arms race in 1960, which showed the defense expenditure patterns of rival nations in an action-reaction framework. It was a seminal study investigating arms races between military rivals. Richardson used two differential equations to explain the arms race. In the classical arms race or Richardson model, each country's weapons acquisition or defense spending is a function of both countries' weapons acquisition or defense spending. The model assumes that each country is a single integrated actor and there is a single homogeneous weapon. A typical Richardson model, as shown by Dunne, Nikolaidou, and Smith (1999), is given by two differential equations:

$$\frac{dD_1}{dt} = \alpha_{10} + \alpha_{11}D_1 + \alpha_{12}D_2 \quad (1)$$

$$\frac{dD_2}{dt} = \alpha_{20} + \alpha_{21}D_1 + \alpha_{22}D_2 \quad (2)$$

where D_j is the defense expenditure of country j (j = 1, 2), $\frac{dD_1}{dt}$ is the rate of change in country 1's defense expenditure, $\frac{dD_2}{dt}$ is the rate of change in country 2's defense expenditure, α_{12} and α_{21} are the reaction or defense coefficients, α_{11} and α_{22} are the fatigue coefficients, and α_{10} and α_{20} are the grievance terms (or constants); α_{12} and $\alpha_{21} > 0$ and α_{11} and $\alpha_{22} < 0$.

Equations (1) and (2) reveal that the change in defense spending or weaponry stock of one country is a linear function of its own weaponry stock or defense expenditure, its rival country's weaponry stock or defense expenditure, and a constant or grievance term.

The reaction coefficients α_{12} and α_{21} are assumed to be positive and show that, when the level of defense spending or weaponry stock of one country increases, so does that of its rival country. The fatigue coefficients α_{11} and α_{22} indicate that the rate of change in a country's level of defense spending or weaponry stock is negatively related to its own defense expenditure or arms acquisition, and reflects the economic or administrative incidence of an arms race. Finally, in the Richardson model, α_{10} and α_{20} are grievance terms or constants that will be positive if the two countries have hostile relations and negative if they have friendly relations with each other.

Although the classical Richardson model is considered the most influential formal model of arms races in the literature, its results can prove

disappointing when applied to data (see Sandler & Hartley, 1995). This is primarily because the model is theoretical and subject to problems when applied empirically. When any theory is measured empirically to confirm its validity, one must take into account issues such as functional form, the measurement of variables, and lag length, etc., which the theory itself does not. Other problems may relate to data quality and reliability and the results derived may be ambiguous. Finally, various techniques of estimation can present their own problems.

The review of the literature below suggests that different studies on arms-race models have used various estimation techniques, including game theory, dynamic models, forward-looking models, distributed lags or vector autoregression (VAR), error correction, and simultaneous equation systems (see Deger & Sen, 1990; Dunne & Smith, 2007; Georgiou, 1990; McGinnis, 1991; Öcal, 2003). New developments in econometrics allow one to apply these techniques to arms race models and investigate why traditional arms race approaches have yielded disappointing results. Accordingly, we apply the generalized method of moments (GMM), which has not yet been used to re-examine the Richardson model.

3. Arms Race Studies on Pakistan and India: An Empirical Review

The longstanding military rivalry between Pakistan and India makes them key areas of research in the arms race literature, although no study has drawn a precise conclusion of the arms race between the two neighbors. Hollist (1977) applies the Richardson model and its variants to the arms race between Pakistan and India, using data for the period 1949 to 1973. The reaction coefficients are found to be negative rather than positive (as the Richardson model and its variants would suggest). Hollist thus considers that internal factors may account better for the two countries' defense expenditures.

Deger and Sen (1990) investigate the arms race process in Pakistan and India, using the augmented Richardson model for the period 1960–85. The augmented variables include GDP, arms production, arms imports, and the ratio of central government expenditure to GDP to capture economic factors of defense spending. The study argues that the size asymmetry between the two countries implies that they face dissimilar threats and have different defense perceptions.

Additionally, the study shows that India's one-year lagged defense spending and arms imports are significant factors in determining

Pakistan's defense spending. The ratio of central government expenditure to GDP suggests that the government has a positive impact on defense budget allocations, while GDP has a minor effect. In India's case, Pakistan's one-year lagged defense spending shows no significant impact on Indian military expenditure. The two variables, arms production and arms imports, are not significant, but GDP is a prime mover of defense spending in India. Overall, the study is inconclusive, implying that, while Pakistan is responsive to Indian defense spending, India is not responsive to Pakistan's defense expenditure.

Oren (1994) evaluates the arms race between Pakistan and India for the period 1947 to 1990. The study reveals that either country's defense spending depends not only on its rival's defense spending, but also on the latter's bellicosity. The latter becomes a stronger factor when the first country has smaller defense expenditures or military power. The findings indicate that both countries' defense spending increases when their rival displays rising aggression. However, both react negatively in response to their rival's defense spending.

Dunne et al. (1999) use the Richardson model to examine the arms race between Pakistan and India for the period 1962–96 under a VAR framework. Using Johansen cointegration, the study suggests there is a long-run relationship between both countries' real defense expenditure (RDE). The reaction coefficients are positive for both countries and there is bidirectional causality between their levels of defense spending.

Öcal (2003) assesses the Indo-Pakistan arms race for the period 1949–99, including the asymmetric effects of both countries' defense spending, based on a smooth-transition nonlinear model. The study finds possible nonlinear dynamics between the two countries' defense expenditures. Yildirim and Öcal (2006) examine the causality between Pakistan and India's defense spending during 1949–2003. Based on seemingly unrelated regressions in a multivariate VAR model, the study applies the Granger causality test and finds bidirectional causality between both countries' defense spending.

Dunne and Smith (2007) reinvestigate the arms race between Pakistan and India, using revised RDE data provided by SIPRI. They re-estimate the Richardson model in a VAR framework for the same period as Dunne et al. (1999), but with slightly different results. Subsequently, they extend the time period from 1962 to 2003. The findings give some indication of a long-run relationship between the countries' RDEs.

While, for various reasons, none of these studies is strictly conclusive, they do show that a country's defense spending is not determined solely by that of its rival. Other factors, such as conflict history and the dynamics of their defense spending, must also be considered.

4. Methodology and Specification of the Richardson Approach

Regression analysis assumes that independent variables are not correlated with the error term and a violation of this assumption would mean that ordinary least squares (OLS) estimators and weighted least squares estimators would be biased and inconsistent. When some of the independent variables are correlated with the disturbance term, they become endogenous variables; those that are uncorrelated with the error term are exogenous variables.

Instrumental variables (IVs) are used when there is an endogeneity problem, especially in a simultaneous equation system. Generally, three basic approaches – two-stage least squares (2SLS), limited information maximum likelihood, and GMM – are used when facing problems of endogeneity and simultaneity. In this case, we use the GMM to account for the endogeneity and simultaneity present in the Richardson model.

The general Richardson model (see eq. 1 and 2) can be written in discrete time and with the stochastic error term as:

$$\Delta D_{1t} = \alpha_{10} + \alpha_{11} D_{1t-1} + \alpha_{12} D_{2t} + u_{1t} \tag{3}$$

$$\Delta D_{2t} = \alpha_{20} + \alpha_{21} D_{1t} + \alpha_{22} D_{2t-1} + u_{2t} \tag{4}$$

These two equations are in autoregressive form where D_{jt} is the defense expenditure of country j at time t where j = (1, 2) with 1 representing Pakistan and 2 representing India. The error terms are assumed to satisfy the following properties:

$E(u_{jt}) = 0$

$E(u_j^2) = \sigma_j^2$

$E(u_{jt}, u_{kt}) = \sigma_{jk}$

$E(u_{jt}, u_{k,t-s}) = 0$ where $s \neq 0$ and j and k = 1, 2.

The Richardson model in structural form can be written as:

$$\Delta D_{1t} = \alpha_{10} + \alpha_{11} D_{1t-1} + \alpha_{12} \Delta D_{2t} + \alpha_{13} D_{2t-1} + u_{1t} \quad (5)$$

$$\Delta D_{2t} = \alpha_{20} + \alpha_{21} D_{2t-1} + \alpha_{22} \Delta D_{1t} + \alpha_{23} D_{1t-1} + u_{2t} \quad (6)$$

Substituting eq. (6) into eq. (5), we derive the reduced-form models:

$$\Delta D_{1t} = \pi_{10} + \pi_{11} D_{1t-1} + \pi_{12} D_{2t-1} + \varepsilon_{1t} \quad (7)$$

$$\Delta D_{2t} = \pi_{20} + \pi_{21} D_{1t-1} + \pi_{22} D_{2t-1} + \varepsilon_{2t} \quad (8)$$

The variables ΔD_{2t} and ΔD_{1t} indicate the presence of endogeneity. Endogeneity implies that, when the explanatory variable is a random variable – that is, not fixed as suggested in the OLS method – and the covariance between that variable and the error term is not equal to 0, the OLS estimators become biased and inconsistent even in the asymptotic case. Almost all solutions to the endogeneity problem involve the use of IVs. A valid IV should be able to track changes in the endogenous variable reasonably well. In this case, the IVs are D_{1t-1}, D_{2t-1}, ΔD_{2t-1}, and ΔD_{1t-1}. The first technique that captures endogeneity is 2SLS, which entails (i) regressing the vector of the explanatory variables on the IVs, and (ii) replacing the explanatory variables with the estimated value of the first-stage explanatory variable, using OLS to obtain estimators of asymptotically unbiased 2SLS parameters.

In both cases (OLS and 2SLS), the estimator is the ratio of the weighted sum of the dependent variables to the weighted sum of explanatory variables. In each case, the weights used in the numerator and denominator are the same, but the 2SLS estimators use *Z* (the instrument) as a weight whereas the OLS estimators use *X* (the explanatory variable). The second technique, the method of moments (MM), is based on the moment condition. If the expected value of the instrument and error term is equal to 0, the MM estimator gives the same estimator as does 2SLS.

When the model is exactly identified, under certain assumptions the MM estimators are the same as the OLS estimators. The MM estimators are derived from moment conditions only when the model is exactly identified. However, if the moment conditions are in excess or over-identified, there is no unique solution for the MM. In this case, the most appropriate technique is the GMM in which all the moment conditions are used optimally by minimizing the sum of the square of deviation of moments from 0. In the general case of excess moments, the GMM is considered the most efficient compared to other techniques (Hansen, 1982; Studenmund, 2010).

Over-identifying restrictions mean that the number of instruments is greater than the number of parameters. This minimizes the value of the GMM objective function. The J-statistic (Sagan statistic) is used in the GMM to test the hypothesis of validity for over-identifying restrictions. Under the null hypothesis that the model is correctly specified and over-identifying restrictions satisfied, the J-statistic has an asymptotically χ^2 distribution with degrees of freedom (d.f.) equal to the number of over-identifying restrictions (Hansen, 1982).

5. Data, Trends and Empirical Results

This section describes the dataset used, the trends that emerge in RDE and economic growth, and the model's results.

5.1. Data

The data on Pakistan and India's defense expenditure is, respectively, from the *Handbook of Statistics on Pakistan Economy* for 2010 (published by the State Bank of Pakistan) and the *Handbook of Statistics on the Indian Economy* for 2011 (published by the Reserve Bank of India). The data on the dollar exchange rate, GDP at constant 2000 US$, and GDP at current 2000 US$ is from the World Development Indicators and Global Development Finance databases for the two countries.

We have converted the variables – the defense expenditures of both countries – from local currency to US$ by means of their respective dollar exchange rates and then deflated the variables using the GDP deflator to find inflation-adjusted or real variables (RDE).

5.2. Trends in Defense Expenditure and Economic Growth

Pakistan and India are considered less developed countries with numerous economic and security concerns. As Figure 1 shows, their RDE trends upward from 1972 to 2010. Pakistan's RDE (RDEP) increases from US$ 1,139.378 million in 1972 to US$ 2,897.89 million in 2010, while India's RDE (RDEI) increases from US$ 3,170.47 million in 1972 to US$ 11,465.27 million in 2010. Thus, RDEP rises more than twofold in this period while RDEI rises more than threefold. Moreover, the two do not increase at the same pace.

Figure 1: Trends in RDE, Pakistan and India

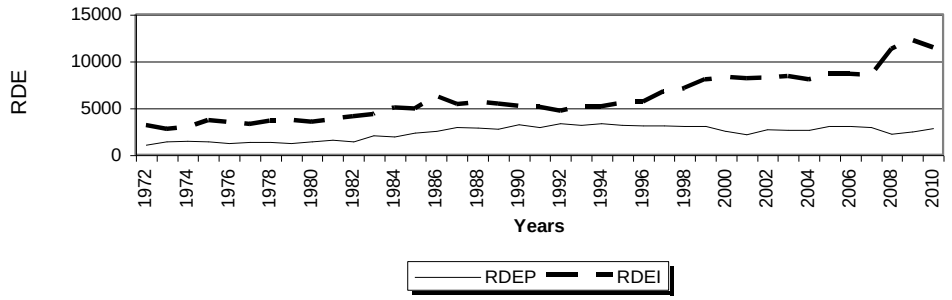

Table 1 summarizes the decade-wise averages and percentage changes in RDEP and RDEI. The overall average RDEP and RDEI is US$ 2,456.65 million and US$ 6,049.96 million, respectively, with the latter more than twice as large as the former. The maximum value of RDEP is US$ 3,440.833 million (in 1994) while the minimum value is US$ 1,139.37 million (in 1972). Similarly, the maximum value of RDEI is US$ 12,239.39 million (in 2009) and the minimum value US$ 2,773.41 million (in 1973).

Table 1: Pakistan and India, RDEP and RDEI

Period	RDEP	% Change	RDEI	% Change
1972–80	1,393.26		3,364.37	
1981–90	2,430.42	74.44	5,035.89	49.69
1991–2000	3,154.78	29.80	6,161.99	22.36
2001–10	2,741.78	-13.10	9,369.04	52.04
Maximum value	3,440.83		12,239.39	
Minimum value	1,139.37		2,773.41	
Overall average	2,456.65		6,049.96	

RDEP increases by 74.44 percent in the first decade of the sample period and by 29.80 percent in the second decade. It then falls by 13.1 percent in the last decade. RDEI increases by 49.69 percent in the first decade and by 22.36 percent in the second decade. In the last decade, RDEI increases dramatically by 52.04 percent in contrast to RDEP.

Next, we apply the augmented Dickey–Fuller test to check the stationarity of the two data series. In both cases, the RDE is integrated of order one, i.e., *I*(1). This indicates that both variables are nonstationary or have a unit root, but their linear combination becomes stationary.

Multivariate analyses use variables of the same order of integration (Sims, 1980). Stock and Watson (1996) argue against differencing even if the variables contain a unit root because they can still be used to estimate structural equations. The main argument against differencing is that it "throws away" information on any co-movement in the data (such as the possibility of cointegration). Similarly, the data need not be de-trended (Enders, 2009). We therefore use nonstationary variables in the GMM.

5.3. GMM Results of the Richardson Model

The GMM-based results of the Richardson model (eq. 5 and eq. 6) are given in Table 2. In eq. (5) and eq. (6), D_{jt} (j = 1, 2) is the defense expenditure of either country; eq. (5) is specified for Pakistan and eq. (6) for India. In the first case, the dependent variable is ΔD_{1t} and the independent variables are D_{1t-1}, ΔD_{2t}, and D_{2t-1}. This shows that a change in Pakistan's defense spending is a function of (i) its own defense spending in the previous period, (ii) a change in India's defense spending, and (iii) India's defense spending in the previous period. The intercept value α_{10} (the grievance term) is 217.24. Since this is positive, it suggests that Pakistan and India are rivals rather than allies.[1]

Pakistan's previous-period defense spending is negatively related to the change in its own defense spending. The value of parameter α_{11} (the fatigue coefficient) is –0.1969, which is negative (as suggested by theory) and highly significant. This implies that Pakistan's defense spending falls due to an increase in its previous-period defense spending, which is consistent with Richardson's theory: the rate of change in a country's level of defense spending or weaponry stock is negatively related to its own defense expenditure or arms acquisition, and reflects the economic or administrative incidence of an arms race.[2]

[1] In the context of positive grievance terms, Sandler and Hartley (1995) observe that, "a nation may augment its armament even though the other nation poses no threat. Grievance may arise from a past defeat (Germany after World War I or Iraq after the Gulf war) or else from territorial or religious disputes." Choucri and North (2001) keep "the constants in the empirically estimated equations to suggest that a given nation may desire a certain amount of arms even if its opponents have no arms."

[2] Sandler and Hartley (1995) comment on the negative fatigue term as follows: "Nation A diminishes its rate of armament expansion in proportion to its existing forces. This expression reflects economic consideration or constraints that limit the nation's ability to redirect resources from civilian uses. Moreover, the fatigue term may also reflect the depreciation of the existing weapons stock as resources must be allocated to maintain current stockpiles."

Table 2: GMM estimates of Richardson model (eq. 5 and 6)

Pakistan			**India**		
Dependent variable = ΔD_{1t}			Dependent variable = ΔD_{2t}		
Regressors	GMM est.	OLS est.	Regressors	GMM est.	OLS est.
Intercept	217.2413	272.8579	Intercept	-480.1526	206.9299
	(0.0728)	(0.0780)		(0.0728)	(0.5805)
D_{1t-1}	-0.1969	-0.120464	D_{2t-1}	-0.0687	0.012339
	(0.0061)	(0.0822)		(0.1317)	(0.8103)
ΔD_{2t}	0.4524	-0.167691	ΔD_{1t}	2.2102	-0.940983
	(0.0000)	(0.0164)		(0.0000)	(0.0164)
D_{2t-1}	0.0311	0.017700	D_{1t-1}	0.4352	-0.007359
	(0.1317)	(0.4127)		(0.0061)	(0.9650)
Diagnostic tests					
Determinant residual covariance			0.4720		
J-statistic			0.0111		
DW	2.03	2.26	DW	2.03	2.14

Note: p-values in parentheses.
Source: Authors' calculations.

The defense or reaction coefficients α_{12} and α_{13} in the specified model are 0.4524 and 0.0311, respectively. Their coefficients are positive, indicating that there will be a positive change in Pakistan's defense expenditure in response to India's defense spending. Under the Richardson model, the reaction coefficients α_{12} and α_{13} are assumed to be positive and show that a country's level of defense spending or weaponry stock increases when that of its adversary also increases. Of the two reaction coefficients, the change in India's defense spending is highly significant; the other, India's previous-period defense spending, is not significant.

In the model specified for India, the dependent variable is ΔD_{2t} and the independent variables are D_{2t-1}, ΔD_{1t}, and D_{1t-1}. It is evident that a change in India's defense spending depends on its own previous-period defense spending and on its rival's change in defense spending and previous-period defense spending. The intercept value, α_{20}, is –480.1526. The fact that the grievance term is negative suggests that Pakistan and India have friendly relations with each other, contrary to the result obtained for Pakistan. This makes it difficult to establish the nature of relations between the two countries on the basis of their grievance terms.

India's previous-period defense spending is inversely related to the change in its own defense spending. The value of parameter α_{22} (the fatigue coefficient) is –0.0687. While statistically insignificant, its sign is compatible with the classical arms race theory. The values of the reaction or defense coefficients α_{21} and α_{23} are 2.2102 and 0.4352, respectively. Both variables have the correct signs and are highly significant as proposed by the Richardson model. The positive sign implies that India's defense expenditure will rise in response to an increase in Pakistan's defense spending.

These results are consistent with the arms race studies conducted on Pakistan and India (see Dunne et al., 1999; Yildirim & Öcal, 2006). However, they contradict studies that find negative reaction coefficients for Pakistan and India (see Hollist, 1977; Oren, 1994; Öcal, 2003). Further, some studies provide no evidence of an arms race between Pakistan and India (see Deger & Sen, 1990).

The value of the Durbin–Watson (DW) statistic for both equations is 2.03, which indicates there is no evidence of autocorrelation. We use four instruments to estimate the three parameters, so there is one over-identifying restriction. The critical value of the J-statistic χ_1^2 is 1.534 at a 5 percent level of significance. Therefore, we are unable to reject the null hypothesis and conclude that the model is correctly specified and the over-identifying restrictions valid. The OLS estimates are also reported, although these are not reliable in case of an endogeneity problem.

5.4. Reduced-Form Empirical Results

The reduced-form empirical results of the Richardson model (eq. 7 and 8) are given in Table 3. These equations demonstrate that a change in one country's defense expenditure depends on its own previous-period defense expenditure and that of its rival. Since the reduced-form equations have no inherent simultaneity, they do not violate the classical assumption that all explanatory variables are uncorrelated with the error term. Therefore, they can be estimated using OLS.

Eq. (7) is specified for Pakistan and has two independent variables – its own previous-period defense spending and that of its rival, India – besides the intercept or grievance term. The sign of the grievance term is positive as found for the GMM estimates. The estimated value of the parameter of Pakistan's own previous-period defense spending (D_{1t-1}) is –0.1416. As the Richardson theory would suggest, this is negative and highly significant. The result shows that Pakistan's previous-period defense spending is negatively related to its own defense expenditure.

Table 3: Reduced-form estimates of Richardson model (eq. 7 and 8)

Pakistan		**India**	
Dependent variable = ΔD_{1t}		Dependent variable = ΔD_{2t}	
Regressors	Estimates	Regressors	Estimates
Intercept	282.7885	Intercept	-59.1599
	(0.0441)		(0.4389)
D_{1t-1}	-0.1416	D_{2t-1}	-0.0051
	(0.0281)		(0.4627)
D_{2t-1}	0.0186	D_{1t-1}	0.1259
	(0.2120)		(0.2317)
Diagnostic tests			
DW	2.17	DW	2.06
BPG test	0.5386	BPG test	0.2788
Jarque–Bera (prob.)	0.9141	Jarque–Bera (prob.)	0.0000

Note: p-values in parentheses.
Source: Authors' calculations.

The second variable is India's previous-period defense spending (D_{2t-1}). The estimated value of the reaction coefficient is 0.0186, which is positive as suggested by the theory, but not significant in our model. The results correspond to those obtained from the GMM model. The values of the DW and Breusch–Pagan–Godfrey (BPG) statistics suggest that we cannot reject the null hypothesis of no autocorrelation or heteroskedasticity of residuals, respectively. The probability value of the Jarque-Bera test statistic shows that the residuals are normally distributed.

Eq. (8) is specified for India with similar variables. The sign of the grievance term is negative, similar to the GMM model. The estimated value of the parameter of India's previous-period defense spending (D_{2t-1}) is –0.0051, which is negative but not significant. This shows that India's previous-period defense spending is negatively related to its own defense expenditure.

The second variable is Pakistan's previous-period defense spending (D_{1t-1}). The estimated value of the reaction coefficient is 0.0126, which is positive but statistically not significant. The DW and BPG values suggest that we are unable to reject the null hypothesis of no autocorrelation and heteroskedasticity of residuals, respectively. The probability value of the Jarque-Bera test shows that the residuals are not normally distributed. However, since the sample is small, this does not pose a serious problem.

Overall, the reduced-form estimates of the Richardson model are poor in terms of statistical significance, although their signs are compatible with classical arms race theory. Many such studies do not yield good results (see, for example, Isard & Anderton, 1988; Deger & Sen, 1990; Georgiou, 1990; Kollias, 1991; McGinnis, 1991; Sandler & Hartley, 1995; Georgiou, Kapopoulos, & Lazaretou, 1996; Kinsella & Chung, 1998). However, the structural parameters, which researchers are more likely to consider, are better than the reduced-form estimates.

6. Conclusion

This study has attempted to gauge the presence of an arms race between Pakistan and India. In order to overcome the simultaneity and endogeneity problems, we have applied a GMM model to the Richardson arms race model for data spanning 1972–2010. The Richardson model predicts that a change in one country's defense spending is a function of its defense spending in the previous period, a change in its rival's defense spending, and its rival's defense spending in the previous period.

We have specified structural parameter equations for both countries. The grievance term in Pakistan's model is positive, indicating that Pakistan and India have hostile relations. The economic or administrative incidence of an arms race is captured by Pakistan's previous-period defense spending or fatigue coefficient, which is highly significant and negatively related to changes in Pakistan's own defense spending – as suggested by Richardson's theory. The reaction coefficients are positive, indicating that there will be a positive change in Pakistan's defense expenditure in response to India's defense spending.

The intercept value in India's model is, however, negative, which implies that the two countries have friendly relations. This contradicts the results for Pakistan and makes it difficult to draw any conclusion on the basis of the grievance terms. Our findings also show that India's previous-period defense spending is statistically insignificant and inversely related to changes in India's own defense spending. The reaction coefficients are positive and highly significant.

We have also estimated reduced-form equations demonstrating that a change in one country's defense expenditure depends on the previous-period levels of its own and its rival's defense expenditures. While these estimates are found to be poor statistically, their signs are compatible with the classical theory of arms races. Finally, the overall analysis indicates that an arms race does exist between Pakistan and India.

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A Comparative Returns Performance Review of Islamic Equity Funds with Socially Responsible Equity Funds and the Broader Market Indices

Syed Kalim Hyder Bukhari* **and Mohammed Azam****

Abstract

Islamic mutual funds and socially responsible mutual funds are two similar asset classes that incorporate negative screens in their portfolio selection process to filter out stocks that fail to meet certain ethical, social, environmental, and/or religious standards. This study uses a single-factor capital asset pricing model and an adjusted sample consisting of 224 Islamic funds and 573 socially responsible funds to examine their excess risk-adjusted returns, market volatility, and systematic risk. It also gauges the market-timing abilities of the fund managers concerned in relation to both Islamic/socially responsible and conventional market indices. While there are some differences in the risk factors of Islamic funds and socially responsible funds, both are associated with lower risks and have the same market-timing ability.

Keywords: Islamic mutual funds, capital asset pricing model, returns, systematic risk, market volatility.

JEL classification: G19.

1. Introduction

Since its inception a few decades ago, the Islamic finance industry has become one of the biggest success stories of modern financial diversification: it is on the brink of achieving global asset holdings in excess of US$ 2 trillion (Ernst & Young, 2012). Islamic investments, a key component of this industry, have experienced stellar growth in recent years following the decree issued by a leading global authority of Islamic law – the Islamic Fiqh Academy – permitting Muslims to participate in stock markets through carefully screened stocks and equities.

The number of Islamic equity funds (IEFs) worldwide has increased from merely nine in 1994 to more than 600 today. The unique

* University of Leicester, Leicester, UK.
** University of Sheffield, Sheffield, UK.

characteristics of Islamic investments make them a specific type of socially responsible investment (SRI) – another market that has also witnessed tremendous growth in the last 20 years. The popularity of SRIs is attributed to increasing interest in faith-based investing as well as the growing body of business ethics literature that emphasizes good business practices and corporate social responsibility over the single-minded pursuit of profit and maximizing shareholder value.

However, in order to sustain reasonably attractive growth rates in the long term, the Islamic investments industry needs to broaden its client base by appealing to investors outside its core demographic, which consists overwhelmingly of Muslim investors. This can be achieved if Islamic investments are shown to be an adequate substitute for conventional SRIs by earning returns that are higher, or at least comparable, in order to attract non-Muslim socially responsible investors. Despite the immense size and growth of the industry, the research on Islamic finance remains extremely limited, even more so with regard to IEFs. Our findings, therefore, could prove to be a valuable contribution to the sparse literature on the subject.

The limited literature provides space for further insight into the topic. We take into account more funds and a longer time period improving coverage of the cross-sectional and time series dimensions. Further, the period of our analysis, 2009–2013, is important as far as the financial performance of SRIs and IEFs is concerned. The Islamic finance industry grew, on average, by 17 percent between 2009 and 2013; the total investment in SRIs almost doubled from below US$ 3 trillion in 2009 by the end of 2013. Additionally, we apply Pesaran and Smith's (1995) mean group estimation technique to the heterogeneous panel dataset of funds.

The aim of this paper is to evaluate the comparative performance of Islamic equity mutual funds and socially responsible mutual funds with their respective benchmarks. Both asset classes are also measured against the standard regional market indices to assess their attractiveness based on pure economic returns. This provides insight into how the competitiveness of IEFs and SRIs has kept pace with their rapid growth rates.

The analysis is conducted using two variations of the single-factor capital asset pricing model (CAPM) by estimating standard models of weekly returns data on IEFs and SRIs over the period January 2000 to August 2013. The first equation is Jensen's (1968) variant of the CAPM, which measures risk-adjusted performance; the second equation is

Treynor and Mazuy's (1966) variant of the CAPM, which also measures market timing ability.

Our results broadly concur with the findings of some of the existing literature on the performance of IEFs: on average, they tend to exhibit negative alphas and betas of less than 1, and their funds managers fare poorly in outguessing the market for both Islamic and conventional benchmarks. SRI funds, however, have very similar characteristics, thereby strengthening the case for IEFs as a viable alternative to conventional SRI funds for ethical or socially conscious non-Muslim investors.

SRIs and IEFs are broadly similar in terms of their risk-return characteristics, which could make the latter more attractive to ethical or socially conscious non-Muslim investors. This proposition is even more valid in markets such as the Gulf Cooperation Council (GCC) region and Middle East and North Africa (MENA), where there is a noticeable lack or complete absence of conventional SRI instruments. Our results support this argument and indicate that SRIs and IEFs may be potential substitutes.

2. Literature Review

Islamic funds are characterized by their compliance with the Shari'ah or Islamic law, which defines a financial model based on shared risk and return with certain restrictions, such as the prohibition of *riba* (interest or usury), *maysir* (excessive speculation or gambling), *gharar* (preventable contractual ambiguity or uncertainty), and investments in industries deemed unethical or forbidden by Islamic law. In addition, all monetary and business transactions are subject to a number of secondary conditions, including (but not limited to) principle guidelines such as:

- Money is only a medium of exchange, not an asset, and hence cannot earn a return on itself.
- Risk cannot be sold or transferred, but can be shared.
- Debt cannot be sold, only exchanged at par value.
- Assets must be owned before they can be sold.
- All financial flows must be real economic transactions linked to an underlying asset.

Many renowned global financial services firms – such as Dow Jones, the FTSE, Standard & Poor's, Thomson Reuters, MSCI and Russell – now provide hundreds of Islamic indices categorized by region, industry,

investment objective, and market capitalization. The constituents of any Islamic index, however, must satisfy the following main screening criteria:

- The company's debt–market capitalization ratio or total-debt-to-total-assets ratio must not exceed 33 percent.
- Accounts receivables and liquid assets in the form of marketable securities and bank accounts should not comprise more than 45 percent of a company's total assets, while cash and any equivalent holdings that generate interest income should not be greater than 33 percent of the company's total assets.
- Income from interest or any otherwise prohibited economic activity must be less than 15 percent of total revenue and be donated to charity.

Although the filters applied by the Shari'ah supervisory boards of various index providers are largely homogeneous, the complexity of Islamic law and jurisprudential disagreements between its main schools of thought mean that the exact values of the stated financial ratios can differ. As a result, there is a noticeable lack of consensus and standardization in this regard, which may be cause for concern about the growth prospects of inter-regional Islamic investment.

In contrast, SRIs are not subject to any predetermined financial parameters in their screening process. Their filters also incorporate criteria such as compliance with environmental regulations, corporate transparency, and companies' or countries' human rights records – factors that are not taken into account when filtering stocks for Islamic prohibitions. Another important distinction is that SRIs' ethical committees are generally advisory bodies while the opinions of Shari'ah supervisory boards are binding and essential.

Hayat and Kräussl (2011) posit that IEFs "may as well be an interesting investment for non-Muslims, especially for those who see IEFs as a type of SRI." The literature appears to support this assertion: for example, Renneboog, Ter Horst, and Zhang (2008) classify Islamic (and other religious) funds as a form of socially responsible investing. Pornography, tobacco, arms manufacturing, alcoholic beverages, and gambling are generally excluded by both.

The difference between Islamic funds and other SRIs lies in the types of businesses they avoid: Islamic funds avoid investments in interest-based financial institutions – such as banks, mortgage and insurance firms, and hedge funds – and pork producers, which usually pass SRI filters

(Renneboog et al., 2008). However, Forte and Miglietta (2011) argue that IEFs should be excluded from any filters, including SRI filters. They are reluctant to classify IEFs as socially responsible funds because the latter normally have the primary objective of profitable investing with social responsibility screens added potentially due to the fund manager's moral beliefs or to minimize legal and environmental issues. IEFs, on the other hand, apply primarily a religious screen with the profit motive being secondary. Further, their compliance with Shari'ah principles suggests that IEFs may include some investments that would be excluded under most SRI principles. For instance, IEFs are more likely to invest in countries such as Syria, Iran, and Saudi Arabia, which the conditions of most SRI funds would exclude (Forte & Miglietta, 2011).

Commenting on the expected performance of socially responsible funds, Geczy, Stambaugh, and Levin (2005) suggest that, "investors who allocate their wealth to socially responsible mutual funds pay a price." This is likely because applying socially responsible principles creates additional overheads for the fund manager in two ways: First, fund managers face limitations in the universe of possible investments for the fund. Second, fund managers need to spend time and resources evaluating the social principles of potential investments, which may have no direct correlation with their economic attractiveness.

To some extent, Derwall, Guenster, Bauer, and Koedijk (2005) contradict these results: they measure social responsibility by ecological efficiency and find that portfolios comprising the equity securities of the most socially responsible companies tend to have higher average returns than their lower ranked counterparts. Although this precludes the influence of an active fund manager in determining portfolio returns, the study suggests there may be an ambiguous relationship between portfolio returns and imposing socially responsible principles on investment.

With respect to whether the Islamic funds screening process has a noticeable negative impact on returns and efficiency when compared to conventional funds and investments, the literature remains inconclusive. While Geczy et al. (2005) point to many standard stocks delivering significantly positive abnormal returns, empirical studies such as Abdelsalam, Fethi, Matallín, and Tortosa-Ausina (2014) compare restricted Islamic portfolios with their unrestricted counterparts and find no significant performance differences between the two. They hypothesize that the limited investment asset universe may be offset by the financial ratios criteria imposed by Islamic screens that exclude companies in debt

and excessive leverage – often indicators of poor performance. For example, Enron and WorldCom were excluded from the constituent lists of Islamic benchmarks shortly before they went bankrupt.

While the literature on SRIs has grown in parallel with the industry itself, academic research on Islamic investments has not kept pace with the expansion and proliferation of IEFs worldwide. Studies on IEF performance are scarce. The two most comprehensive and commonly cited works on the subject, Hayat and Kräussl (2011) and Hoepner, Rammal, and Rezec (2011), are both fairly recent. Prior research is fairly limited in terms of scale, sample size, and time periods, and focuses mostly on Malaysia, which remains the hub of Islamic finance despite the Arab states of the GCC (Saudi Arabia, Qatar, Kuwait, and the United Arab Emirates) collectively accounting for a larger proportion of Shari'ah-compliant assets worldwide.

Hayat and Kräussl (2011) use a survivorship bias-adjusted sample of 145 IEFs categorized into five regions: global, Malaysia, Asia-Pacific, Europe and the Middle East, and North America. The analysis applies Jensen's (1968) model and Treynor and Mazuy's (1966) CAPM regressions to weekly pricing data for the period 2000–09, using Islamic as well as conventional benchmarks as market proxies. The results indicate that IEFs have, on average, negative alphas (risk-adjusted returns) and betas (systematic risk) of less than 1. Islamic fund managers are found to be poor market timers and the lack of any significant downside risk rules it out as a potential explanation for the underperformance of IEFs.

While Hoepner et al. (2011) also employ a CAPM regression analysis – albeit a variant in the form of a multi-factor Carhart model – to a larger sample of the monthly returns of 265 IEFs over a very similar time period, they fail to conclude that IEFs outperform or underperform relative to equity markets in general. Rather, they find that IEFs from the six largest Islamic financial centers in their study (the GCC countries and Malaysia) are "competitive or even outperform international equity market benchmarks." This implies that IEF performance has a visible home bias and tends to benefit from close proximity to its main markets. The authors also observe that IEFs clearly prefer small-caps and growth stocks – a finding with which Hayat and Kräussl (2011) concur.

The discrepancies between these two sets of results are most likely caused by two factors:

- *Sample size and characteristics*. Although the GCC/MENA region is the largest regional shareholder of total Islamic assets worldwide, it is severely underrepresented by Hayat and Kräussl (2011). Only three out of a total of 145 funds are from the Middle East, comprising a mere 2 percent of their sample. In contrast, Hoepner et al. (2011) use a sample of 265 funds, which is both larger and proportionally diverse. The particulars and sources of data are also markedly different. Hayat and Kräussl use weekly pricing data from Bloomberg, adjusted for dividends and capital gains, while Hoepner et al. obtain their data from Eurekahedge's database, which consists of unadjusted monthly returns.
- *Model specification*. The multi-factor conditional Carhart CAPM model selected by Hoepner et al. (2011) introduces additional factors for size and the value of the book-to-market ratio, for which the single-factor models used by Hayat and Kräussl (2011) do not account. Although both studies convert the pricing data into US dollars, Hayat and Kräussl use a single risk-free rate while Hoepner et al. choose different interest rates for different regions in their specification.

Abdelsalam et al. (2014) employ partial frontier and quantile regression methods instead of the CAPM as the main component of their analytical framework. Since their main aim is to assess the performance and efficiency of Islamic and SRI mutual funds relative to each other, they have very little to say about fund performance relative to established benchmarks and the market timing ability of fund managers. Nevertheless, Abdelsalam et al. conclude that, despite differences in the portfolio management and screening criteria of IEFs and SRI funds, variations in performance are found only for "some of the quantiles of the conditional distribution of mutual fund performance."

Based on the differences in opinion of the various studies reviewed above, we propose to empirically evaluate differences in the risk and return characteristics of both SRIs and IEFs. This supports the assertion made by Forte and Miglietta (2011) that the two investment classes are fundamentally different, unlike Renneboog et al. (2008), who classify IEFs together with SRIs.

Fund managers carry out two types of activities: security selection and market timing (Kon, 1983). Professional fund managers are assumed to have significant positive skills in either activity to justify the payment of fees. If, for example, they cannot deliver significant outperformance and if any performance in the fund is purely due to changes in the market, fund managers may not be able to justify charging a fee because investors could,

theoretically, obtain the same performance by investing in a diversified portfolio on their own. The available empirical evidence, however, suggests that market timing ability varies between fund managers. Cuthbertson, Nitzsche, and O'Sullivan (2010) use a nonparametric model introduced by Jiang (2003) to examine the market timing ability of mutual fund managers in the UK. The authors find that, on average, fund managers tend to mistime the market, leading to negative returns.

Abdullah, Hassan, and Mohamad (2007) use a similar method to ours (the Treynor–Mazuy model) to estimate the ability of Malaysian fund managers in the government, nongovernment, conventional, and Islamic sectors to market-time. The authors find that all four categories of fund managers showed negative market timing ability over all periods before, during, and after a financial crisis (the Asian crisis of 1997). Hayat and Kräussl (2011) similarly find that IEF managers have poor market timing ability when measured against both conventional and Islamic benchmarks and using both the Treynor–Mazuy and nonparametric models.

There are several reasons for this apparent contradiction with respect to the theory. Cuthbertson et al. (2010) argue that it may be due to the impact of cash flow on fund behavior: when markets are rising, funds tend to experience investor cash inflows, which leads to a higher cash position vis-à-vis their holdings in risky securities and to lower market exposure and returns. The reverse is true when markets are falling. Further, fund managers may posit a relationship between the general price level of the market and market volatility where, even if they believe that the market as a whole is expected to rise further, they do not increase the portfolio's market exposure due to concerns about increased volatility. On the basis of this argument, we seek to explore the market timing ability of fund managers for both IEFs and SRIs.

3. Theoretical Framework

The classic model measuring fund performance is Jensen's (1968) alpha model,[1] which is based on the CAPM and is denoted as follows:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p \left(R_{mt} - R_{ft}\right) + \varepsilon_{pt} \quad (1)$$

where R_{pt} is the return on portfolio (or fund) p at time t, R_{ft} is the return of some risk-free asset at time t,[2] the USD ten-year swap rate, R_{mt}, is the

[1] See Patro (2001) for an application of Jensen's alpha to mutual funds.
[2] This study uses the same risk-free asset as Hayat and Kräussl (2011).

return of the market portfolio at time t, and ε_{pt} is the error term. α_p is Jensen's (1968) alpha normally interpreted as the excess performance of a fund relative to that of the market portfolio and β_p is the beta factor or the portfolio's sensitivity to changes in the underlying market portfolio.

A risk-free rate of return inherently contravenes one of the fundamental principles of Islamic finance, but the possibility of such a benchmark ever being Shari'ah-compliant does exist. In principle, the lack of suitable alternatives and the wide use of risk-free rates in Islamic equities using the CAPM employs some kind of standard risk-free rate, be it the T-bill rate or the USD ten-year swap rate. There is a certain paradigm here to which we have adhered for the sake of academic consistency.

Since only one factor is used as a benchmark (the market proxy), the model above is a single-factor model. A significant problem associated with single-factor models is the comparatively poor R^2 of the regression. As a result, multi-factor models are proposed as a way to improve the proportion of the variance explainable by the regression equation. Fama and French (1993) provide an influential three-factor model, which includes an additional factor for size (small vs. big companies or SMB) and one for the ratio of the book-to-market value ("value" vs. "growth" stocks or HML):

$$R_{pt} - R_{ft} = \alpha_p + \beta_{pm}\left(R_{mt} - R_{ft}\right) + \beta_{pSMB}\, SMB_t + \beta_{pHML}\, HML_t + \varepsilon_{pt} \qquad (2)$$

Treynor and Mazuy (1966) introduce another important addition to the standard CAPM – a factor testing whether the fund can employ marketing timing procedures to improve its returns. Applying their variant to equation (1) yields:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p\left(R_{mt} - R_{ft}\right) + \gamma_p\left(R_{mt} - R_{ft}\right)^2 + \varepsilon_{pt} \qquad (3)$$

where γ_p is a factor determined by the regression, representing the market timing ability of the manager of portfolio p.

4. Data and Sample Description

The data for this study was collected from a Bloomberg terminal, consistent with the methodology used by Hayat and Kräussl (2011). The data provided by Bloomberg includes distributions and is adjusted for cash and capital changes such as dividends, redemptions, and liquidation. All the data reflects five-day percentage price changes (converted into US dollars):

$$\left[\frac{Last\ trade - closing\ price\ five\ days\ ago}{Closing\ price\ five\ days\ ago}\right] * 100$$

The frequency of the pricing data has been adjusted from daily to weekly because this allows us to avoid the excessive volatility of daily price changes. Moreover, it prevents any loss of information resulting from the far lower number of observations in a monthly time series. We expand on Hayat and Kräussl's (2011) timeframe by investigating the entire period from 3 January 2000 to 31 August 2013. This yields a maximum of 713 weekly returns figures obtained for each fund.

Next, we attempt to address the problem of finding appropriate benchmarks. The data shows that some of these funds have a regional or global focus; therefore, a fund may be domiciled in one country (Saudi Arabia) but invest regionally (the Middle East) or globally. A potential way of dealing with international funds is to benchmark them against a suitable global equity index, but Gregory and Whittaker (2007) argue that many SRI funds show evidence of home bias and variation in the degree of bias between funds. Thus, they recommend benchmarking against the MSCI World index and including some home factors to account for home bias. This increases the number of factors in the required regression by two. Adjusting equations (1) and (3) for Jensen's alpha and the Treynor–Mazuy variant respectively, we have:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{wp}\left(R_{wt} - R_{ft}\right) + \beta_{wd}\left(R_{wt} - R_{mt}\right) + \varepsilon_{pt} \quad (4)$$

$$R_{pt} - R_{ft} = \alpha_p + \beta_{wp}\left(R_{wt} - R_{ft}\right) + \gamma_{wp}\left(R_{wt} - R_{ft}\right)^2 + \beta_{wp}\left(R_{wt} - R_{mt}\right) + \varepsilon_{pt} \quad (5)$$

where R_{ft} and R_{mt} are the returns on the domestic and world benchmark indices, respectively. However, the dataset does not contain enough information to ascertain the true origin of the fund – for example, a fund may be domiciled in the Cayman Islands, but its operations may be located elsewhere in the world – and therefore Gregory and Whittaker's (2007) adjustments for home bias cannot be incorporated.

Having collected data on the relevant funds from the Bloomberg database, the number of funds is filtered using a methodology simplified from that of Hayat and Kräussl (2011). Funds with data missing for more than ten consecutive weeks are removed from the sample, as are those with fewer than 30 readings over the entire 2000–13 period and those with an inception date of later than January 2012. The only adjustments made to the original data are with respect to funds that either have insufficient

overall observations or large gaps in their data (namely ten consecutive weeks), and these are simply excluded. While Hayat and Kräussl (2011) attempt to fill in periods of missing data by taking the averages of the preceding two periods for which data is available, we have opted to leave missing data as is. This ensures that the regressions conducted are based only on the data obtained from Bloomberg.

The dataset contains an adjusted sample of 224 Islamic funds with the following geographic focus: global, GCC/MENA, Malaysia, Asia-Pacific, emerging markets, North America, and Europe. This represents an increase of 54.5 percent from Hayat and Kräussl's (2011) sample size of 145 funds. Moreover, the authors critically underrepresent funds from the GCC/MENA, one of the two most important regional markets in global Islamic finance. Finally, our sample also includes liquidated funds, thereby eliminating the possibility of our results suffering from an upward bias in returns.

Information on the sample of funds is summarized below in Table 1. Further, the dataset includes a number of SRI funds to be compared with the selected Islamic funds. In all, 573 SRI funds are selected after applying the appropriate filters to the Bloomberg data. Table 2 gives the geographic distribution of the SRI funds and the benchmarks used for comparison.

Table 1: Geographic distribution of Islamic funds and benchmarks

Number of funds		Benchmarks	
Region	**Sample**	**Islamic**	**Conventional**
Global	73	Dow Jones Islamic Markets Index	MSCI World Index
GCC/MENA	12	Dow Jones Islamic Markets GCC Index	Tadawul All Shares Index
Malaysia	55	Kuala Lumpur Syariah Index + MSCI Malaysia Islamic Index**	FTSE Bursa Malaysia KLCI Index
Asia-Pacific	50	Dow Jones Islamic Markets Asia Pacific Index	Dow Jones Asian Titans Index
Emerging markets	18	Dow Jones Islamic Emerging Markets Index	MSCI Emerging Markets Index
North America	7	Dow Jones US Islamic Index	S&P500 Index
Europe	9	Dow Jones Islamic Markets Europe Index	FTSE 100 Index
Total	224		

Note: ** denotes a change in benchmark because the Kuala Lumpur Syariah Index was decommissioned in 2008 and returns from the MSCI Malaysia Islamic Index substituted.

Table 2: Geographic distribution of SRI funds and benchmarks

Number of funds		Benchmarks	
Region	**Sample**	**SRI**	**Conventional**
Global	230	Dow Jones Sustainability Worldwide Composite Index	MSCI World Index
Europe	193	Dow Jones Sustainability Eurozone (no tobacco, alcohol, arms, adult entertainment industries) Index	FTSE 100 Index
Asia-Pacific	104	Dow Jones Sustainability Worldwide Composite Index	Dow Jones Asian Titans Index
North America	46	MSCI KLD 400 Social Index (US)	S&P500 Index
Total	573		

5. Methodological Framework and Analysis

Given that we are using panel data that consists of heterogeneous groups, we apply Pesaran and Smith's (1995) mean group technique. Equations (1) and (2) are estimated separately for each group in both categories (IEFs and SRIs) and the average of the coefficients computed so that the intercepts capture individual unobserved effects. Although excess returns are in deviation form, the data is not nonstationary. Nonetheless, to ensure that all the variables are stationary, the ADF test is applied. All the variables are I(0).

Similar to Hayat and Kräussl (2011), we conduct a CAPM analysis but for a larger sample of funds and a longer sample period. The sample of 224 IEFs and 573 SRIs is investigated using the CAPM regression described in equation (1). Individual regressions are run for each of the funds and their alpha and beta coefficients estimated. After confirming the individual significance of the coefficients, the mean group estimators are reported. The purpose of this procedure is to consider the heterogeneity of the individual funds. Table 3 gives the regression results for the IEFs against both Islamic and conventional benchmarks, summarized by region.

Table 3: Mean group estimators of IEF alphas and betas by region

	Islamic benchmarks				Conventional benchmarks			
Region	**α**	**β**	**R^2**	**Obs.**	**α**	**β**	**R^2**	**Obs.**
Overall	-0.0057	0.8105**	0.5409	224	-0.0068	0.7739**	0.5358	224
	(0.0094)	(0.2588)			(0.0085)	(0.2350)		
Global	-0.0091	0.7105**	0.4542	73	-0.0098	0.6810**	0.4580	73
	(0.0094)	(0.2772)			(0.0092)	(0.2684)		
GCC/MENA	0.0105**	1.1657**	0.2651	12	0.0044	0.9367**	0.3225	12
	(0.0076)	(0.1974)			(0.0064)	(0.1779)		
Malaysia	-0.0074**	0.7902	0.7526	55	-0.0068	0.8079**	0.7772	55
	(0.0046)	-0.0993			(0.0052)	(0.1131)		
Asia-Pacific	-0.0030	0.8646**	0.5347	50	-0.0057	0.7796**	0.472	50
	(0.0103)	-0.3090			(0.0092)	(0.2757)		
Emerging markets	-0.0068	0.8537**	0.3728	18	-0.0066	0.8648**	0.3826	18
	(0.0072)	(0.2132)			(0.0068)	(0.2019)		
North America	-0.0043	0.8775**	0.6547	7	-0.0056	0.8405**	0.6286	7
	(0.0089)	(0.1834)			(0.0077)	(0.1424)		
Europe	-0.0041	0.8338**	0.6001	9	-0.0039	0.8369**	0.5656	9
	(0.0078)	(0.1961)			(0.0081)	(0.1989)		

Note: Figures in brackets represent standard deviations. ** Significant at 1% level.
Source: Authors' calculations.

The results show that the IEF betas are lower than those of their respective Islamic as well as conventional benchmarks in the case of all but one region. Furthermore, the IEFs tend to have negative alpha values, although these are statistically insignificant for most of the countries and regions tested. An exception is Malaysia where investors see an alpha of –0.74 percent when compared with the Islamic benchmark.

The GCC/MENA region, however, shows a statistically significant positive alpha of 1.05 percent and a positive beta of 1.17 when compared with the Islamic benchmark. These differences from the other regions are not as prominent when the data is compared with the conventional benchmark for GCC/MENA (the Tadawul All-Share Index). However, it still has a positive, if statistically insignificant, alpha and a beta closest to 1 out of all the regions in the category.

Overall, these results are consistent with Hayat and Kräussl (2011): IEF managers generally tend to underperform relative to conventional benchmarks, but the effect is not statistically significant. One notable divergence, however, is that our regressions generate substantially smaller negative alphas across the board for all IEF regions and, therefore, exhibit

significantly less drag on performance compared to previous estimations. IEFs also tend to be low-beta funds compared to the conventional benchmarks – again, this is broadly similar to the findings of Hayat and Kräussl (2011). According to the equality test performed on the mean group betas of IEFs in various regions, the beta of the Islamic benchmark in the MENA countries is significantly different from that of the conventional benchmarks; the rest show no significant differences.

In contrast to Hayat and Kräussl's (2011) methodology, we have used a larger sample of SRIs than IEFs. Table 4 gives the regression results for the SRIs against both SRI and conventional benchmarks. Unlike the IEF sample, the equality test indicates that the SRI benchmarks in the global, Europe, and overall categories are significantly different from their respective conventional benchmarks.

Table 4: Mean group estimators of SRI alphas and betas by region

	SRI benchmarks				Conventional benchmarks			
Region	**α**	**β**	**R^2**	**Obs.**	**α**	**β**	**R^2**	**Obs.**
Overall	-0.0051	0.8435**	0.7051	573	-0.0026	0.9225**	0.7162	573
	(0.0077)	(0.1908)			(0.0075)	(0.1939)		
Global	-0.0053	0.8550**	0.7337	230	-0.0035	0.9076**	0.7311	230
	(0.0081)	(0.1981)			(0.0084)	(0.212)		
Europe	-0.0064	0.8056**	0.7475	193	-0.0007	0.9754**	0.7475	193
	(0.0070)	(0.1510)			(0.0021)	(0.1589)		
Asia-Pacific	-0.0041	0.8251**	0.5098	104	-0.0050	0.8229**	0.5884	104
	(0.0083)	(0.2242)			(0.0070)	(0.1855)		
North America	-0.0011	0.9866**	0.8260	46	-0.0005	0.9997**	0.8578	46
	(0.0053)	(0.1493)			(0.0052)	(0.1426)		

Note: Figures in brackets represent standard deviations. ** Significant at 1% level.
Source: Authors' calculations.

The CAPM regressions on the SRI funds suggest that they behave similarly to IEFs. While some negative alpha is generated in each of the regions selected for analysis, the differences are not statistically significant. Further, in each region, the SRI funds tend to be low-beta funds when measured against their SRI and conventional benchmarks. Our analysis of SRI fund performance indicates that they have higher betas vis-à-vis their conventional benchmarks when compared with the SRI benchmarks. This implies that the SRIs selected operate more like "normal" investments than those included as SRI benchmarks. A comparison of the mean group estimators of the IEF and SRI samples yields significant differences in the global, North America, and overall categories.

Hayat and Kräussl (2011) initially ask whether IEFs might be an interesting investment option for non-Muslims, particularly those who tend to see IEFs as a type of SRI. Although the authors do not pursue the question, based on the results obtained it would appear that:

- IEFs and SRIs are similar in that they tend to have betas of less than 1 vis-à-vis their respective as well as conventional benchmarks, which suggests that they are less risky than the market portfolio. This makes them an attractive asset class for risk-averse investors during periods of excess market volatility.
- Both IEFs and SRIs tend to underperform slightly relative to their respective benchmarks and conventional benchmarks, although this is statistically insignificant.

It is prudent to point out that the results presented thus far have not yet taken fees into account. Were we to do so, we could argue that both IEFs and SRIs are likely to be unattractive investments in general from a simple risk-return perspective: the purchaser of a basket of these funds would tend to see lower risk than the market, but incur the cost of the fees and a slight performance drag due to a small negative alpha. At the same time, such considerations are unlikely to be of much significance to the socially conscious investor. As mentioned earlier, the idea behind an SRI is to assess a value proposition based on metrics other than maximizing returns, even if doing so incurs a small opportunity cost.

As Hayat and Kräussl (2011) explain, the point of using the Treynor–Mazuy model to vary the regression is to test whether the same conclusions can be drawn with regard to fund performance and systematic risk under conditions of varying systematic risk. The Treynor–Mazuy model, described in equation (3), introduces a market timing ability coefficient (gamma). A statistically significant gamma value would suggest that the manager of that particular fund (or group of funds) has significant market timing ability, indicating his or her managerial skills. The Treynor–Mazuy regression is conducted with the same funds and geographic focus as for the standard CAPM regressions, and the funds are compared with the same benchmarks. Table 5 gives the regression results for the sample of IEFs.

The results indicate that IEF managers in the GCC/MENA region have negative market timing ability vis-à-vis the IEF benchmark: their poor market timing has, in turn, some detrimental effect on performance. IEF managers also show negative market timing ability when compared with conventional and Islamic benchmarks in the other regions, although this

effect is not statistically significant. These results are consistent with those of Hayat and Kräussl (2011), and suggest that IEF managers seem able to engage in market timing ability at an individual level, but cannot outguess the Islamic equity market as a whole.

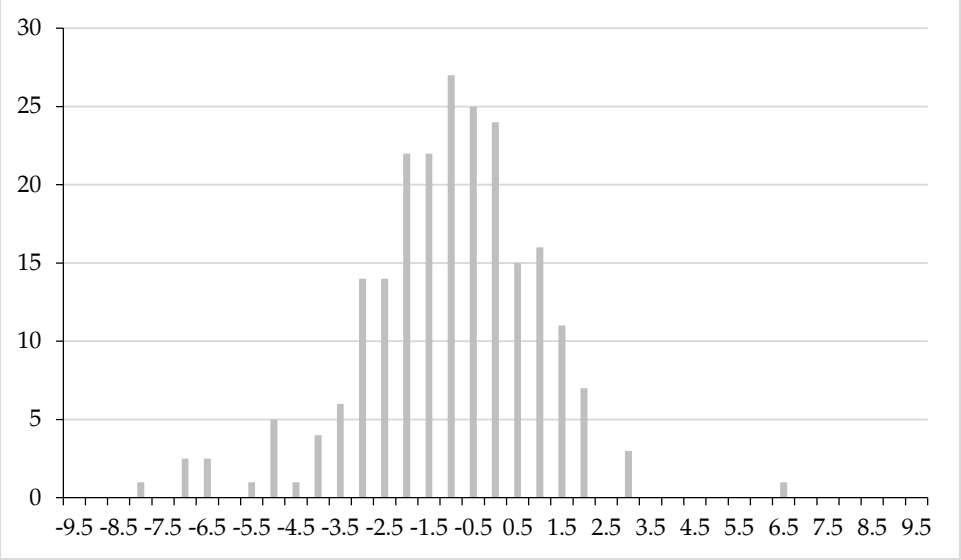
Table 5: Mean group estimators of IEF alphas, betas and gammas by region

	Islamic benchmarks					Conventional benchmarks				
Region	**α**	**β**	**γ**	**R^2**	**Obs.**	**α**	**β**	**γ**	**R^2**	**Obs.**
Overall	-0.0065	0.7042**	-0.0002	0.5518	224	-0.0074	0.6769**	-0.0001	0.5456	224
	(0.0091)	(0.3057)	(0.0003)			(0.0085)	-0.2661	-0.0002		
Global	-0.0098	0.6043**	-0.0002	0.4673	73	-0.0107	0.5692**	-0.0002	0.4692	73
	(0.0097)	(0.3519)	(0.0003)			(0.0091)	-0.3109	-0.0002		
GCC/MENA	0.0003	0.3864	-0.1001**	0.3140	12	-0.0048	0.5121**	0.0000	0.3624	12
	(0.0098)	(0.3813)	(0.0004)			(0.0073)	-0.2633	0.0000		
Malaysia	-0.0074	0.7770**	0.0000	0.7567	55	-0.0072	0.7680**	-0.0001	0.7822	55
	(0.0048)	(0.1229)	(0.0001)			(0.0056)	0.1361)	-0.0001		
Asia-Pacific	-0.0030	0.8088**	-0.0001	0.5443	50	-0.0059	0.7172**	-0.0001	0.4800	50
	(0.0103)	(0.3256)	(0.0002)			(0.0092)	-0.2672	-0.0001		
Emerging markets	-0.0071	0.7499**	-0.0002	0.3809	18	-0.0066	0.8000**	-0.0001	0.3891	18
	(0.0073)	(0.2286)	(0.0003)			(0.0072)	-0.2175	-0.0004		
North America	-0.0050	0.7582	-0.0002	0.6640	7	-0.0062	0.6900	-0.0003	0.6431	7
	(0.0103)	(0.2738)	(0.0003)			(0.0093)	-0.2457	-0.0004		
Europe	-0.0042	0.7521	-0.0001	0.6076	9	-0.0039	0.7210	-0.0002	0.5772	9
	(0.0081)	(0.2323)	(0.0002)			(0.0084)	-0.2476	-0.0003		

Note: Figures in brackets represent standard deviations. ** Significant at 1% level.
Source: Authors' calculations.

To investigate the market timing ability of individual IEF managers, we employ Hayat and Kräussl's (2011) methodology and plot a histogram of the t-values for the gamma of each individual fund manager in the sample of 224 IEFs (see Figure 1).

Figure 1: Histogram of t-statistics of market timing factor for all IEFs



Note: n = 224.

The distribution of t-statistics strongly suggests that fund managers do not exhibit strong market timing ability. The distribution is more negatively skewed with a comparatively large number of fund managers exhibiting negative market timing ability (only one fund achieved a t-statistic in the +6.5–7.0 band). These results appear to support the finding that some IEF managers do attempt to market-time, but are not particularly successful in doing so. A similar analysis is conducted for the SRI sample and is summarized in Table 6.

Table 6: Mean group estimators of SRI alphas, betas and gammas by region

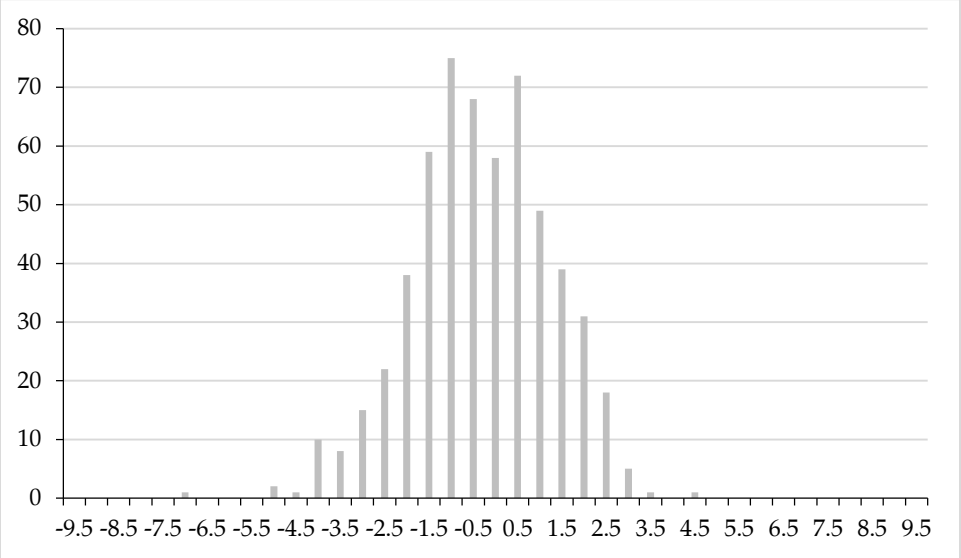
	SRI benchmarks					Conventional benchmarks				
Region	**α**	**β**	**γ**	**R^2**	**Obs.**	**α**	**β**	**γ**	**R^2**	**Obs.**
Overall	-0.0052	0.8124**	0.0000	0.7096	573	-0.0030	0.8945**	0.0000	0.7199	573
	(0.0084)	(0.2942)	(0.0003)			(0.0082)	-0.2545	-0.0001		
Global	-0.0057	0.8018**	-0.0001	0.7391	230	-0.0041	0.8508**	-0.0068**	0.7365	230
	(0.0089)	(0.2667)	(0.0002)			(0.0094)	-0.2931	(0.0002)		
Europe	-0.0063	0.7835**	-0.0034**	0.7510	193	-0.0008	0.9781**	0.0000	0.7359	193
	(0.0071)	(0.1898)	(0.0002)			(0.0067)	-0.1966	-0.0092		
Asia-Pacific	-0.0036	0.8260**	0.0000	0.5151	104	-0.0054	0.7985**	0.0000	0.5917	104
	(0.0098)	(0.4809)	(0.0006)			(0.0076)	-0.2372	-0.0001		
North America	-0.0014	0.9562**	0.0000	0.8273	46	-0.0008	0.9789**	0.0000	0.8578	46
	(0.0057)	(0.1721)	(0.0001)			(0.0054)	-0.1553	-0.0001		

Note: Figures in brackets represent standard deviations. ** Significant at 1% level.

Source: Authors' calculations.

The results for the SRI funds are similar to those for the IEFs. SRI fund managers generally show poor market timing ability globally when compared with the conventional benchmark (the MSCI World index) and in Europe when compared with an SRI benchmark. Figure 2 plots a histogram of the t-statistics for the gamma values of the SRI funds in the sample.

Figure 2: Histogram of t-statistics of market timing factor for all SRI funds



Note: n = 573.

Similar to the IEF sample, the distribution of t-scores for the market timing ability factor is slightly negatively skewed, which suggests that SRI managers attempt to market-time, but do not have strong market timing abilities. In most cases, their attempts to do so lead to a drag on the performance of the fund.

These results reinforce our earlier suggestion with respect to IEFs that fund managers attempt to time their purchases and sales in the market, but that this activity is generally detrimental to the returns they obtain. These results are in line with the existing literature on market timing by funds in general (see Cuthbertson et al., 2010) and for both conventional and Islamic funds (see Abdullah et al., 2007; Hayat & Kräussl, 2011). This diminishes the likelihood of negative market timing ability being detrimental specifically to IEFs.

6. Conclusion

To date, this study is the largest examination of the risk and return performance characteristics of IEFs and SRI funds using the CAPM analytical framework. For instance, we have increased the number of IEFs examined simultaneously to 224 from Hayat and Kräussl's (2011) sample of 145, and included a large sample (n = 573) of SRI funds for a period of 13 years. This has allowed some broad conclusions to be drawn from the universe of IEFs and SRI funds.

There are certain similarities between the risk and return performance of IEFs and SRIs: they tend to be structured such that they have low betas against their individual benchmarks and broader market benchmarks. From a simple economic perspective, neither IEFs nor SRIs appear to be attractive investments: our evidence suggests that both IEF and SRI fund managers show a statistically insignificant alpha over the entire sample period, and while fund managers have tried to time their investments in the market, they have not generally been successful. This explains their statistically insignificant negative performance over the sample period in practically all the geographical groups tested. There is little evidence in the data to suggest that the education and experience of fund managers is manifested in better market timing ability or fund performance. In aggregate, actively managed funds in general – including IEFs and SRIs – tend to underperform relative to the market before accounting for fees.

That said, the increasing prevalence of SRIs as a legitimate asset class in recent decades indicates a growing number of socially responsible investors who are driven by more than purely economic motives. Therefore, given the broadly similar risk-return characteristics of IEFs and SRIs, IEFs might well appeal to the socially conscious non-Muslim investor as a viable alternative, particularly in regional markets such as the GCC/MENA area, among others, where there is a noticeable lack or even complete absence of conventional SRI instruments. Finally, the low betas of IEFs in general with respect to both Islamic and conventional market indices make IEFs an attractive option for risk-averse investors as well as for any portfolio manager during severe market downturns and periods of excess volatility.

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The Determinants of Corporate Dividend Policy in Pakistan

Aliya Bushra* **and Nawazish Mirza****

Abstract

The objective of this study is to identify the significant determinants of firms' dividend policy across different sectors in Pakistan. Using data on 75 companies listed on the KSE 100 index for the period 2005 to 2010, we find that profitable firms tend to give higher dividends than loss-making firms. Firm size has a negative relationship with the dividend payout ratio and dividend yield, indicating that, the larger the firm, the more likely it is to retain cash to pay off its liabilities. Growth in sales is positively related to dividend yield, whereby an increase in sales leads to higher profitability and higher dividend payments. Ownership concentrated within institutions (such as banks and insurance companies), the management/family, and individuals has a negative impact on the payout ratio. Institutional owners are more likely to retain excess cash and thus omit dividends, individual owners prefer capital gains to dividends given the tax deduction, and management- or family-owned firms avoid dividends, which lead to increased agency problems. Finally, the market-to-book ratio is negative and highly significant: firms with better growth opportunities rely on internal financing more than on generating external funds.

Keywords: Market to book, market cap, dividend payout, ownership structure, Pakistan.

JEL classification: G30, G32, G35.

1. Introduction

Dividends are rewards given to investors for their investment in a firm and these rewards can take the form of cash (cash dividends) or stock (stock dividends), depending on the company's policy. These dividends are important to investors because they provide a measure of certainty concerning the company's financial wellbeing. The growth in business also ensures a stable and smooth dividend payout in the future for these firms (Lintner, 1956).

* Assistant Professor, Lahore School of Economics, Pakistan.
** Associate Professor (Finance), Centre for Research in Economics and Business, Lahore School of Economics, Pakistan.

Dividends provide information or "signals" to the market concerning the company's future performance. A dividend cut, for example, immediately signals that the firm is retaining its free cash flow (FCF) for future expansion or that it is uncertain about its future earnings and thus avoiding dividend payouts. Signaling theory argues that managers cannot cut or increase the dividend rate arbitrarily because omitting dividends sends out negative signals to the market (Bhattacharya, 1980).

Jensen's (1986) hypothesis states that any FCF should be distributed among shareholders to reduce agency cost. Rozeff (1982) argues that dividends also provide the indirect benefit of control in the case of FCFs[1] where shareholders do not actively monitor the firm's management. However, the company should not reject positive net present value (NPV) projects simply because it may have to pay dividends or decrease the agency cost; otherwise, future dividend payouts cannot be maintained. Instead, the firm should try to pay dividends while maintaining sufficient retained earnings in order to avoid raising new funds for business expansion. Dividend payments should not be funded through borrowing because this can prove costly for the firm because by doing so, the firm's debt-equity ratio will worsen, eventually affecting its share prices.

Dividends are also irrelevant when firms rely on their own finances for projects (in the absence of a tax system) (see Miller & Modigliani, 1961, who describe irrelevance in the presence of taxes).[2] Modigliani and Miller (1958) show that firm value is independent of dividend policy: investors do not care about a company's dividend policy because they can buy shares and borrow against them. Thus, in the case of no taxes or bankruptcy costs, dividend policy becomes irrelevant.

2. Research Rationale

This paper is based on the following rationale: First, with Pakistan's capital market growing and the economy improving, it would be interesting to find out which factors play an important role in developing and evaluating firms' dividend policy. The insights drawn could help both managers and investors better understand a company's prospects. Managers would also have a clearer view of investors' expectations and

[1] FCFs measure financial performance or valuation calculated as the operational cash flow minus capital expenditure. The FCF represents the cash a company is able to generate after laying out the money required to maintain or expand its asset base.

[2] Miller and Modigliani (1958) posit that dividends are irrelevant when firms finance their projects (in the absence of a tax system). Miller and Scholes (1978) describe irrelevance in the presence of taxes.

design firm policies so as to serve current investors better while attracting new investors.

Second, Pakistan's tax system is different from that of developed markets in that a 10 percent withholding tax is deducted from dividend income. Moreover, unless a firm announces its dividends for a particular year, even if it has made a profit, it is liable to pay a 35 percent corporate income tax. Dividends are subject to double taxation, which is why most investors initially relied on capital gains (for tax exemption).[3] In 2010, however, a capital gains tax on stocks was levied, but not implemented until the fiscal year 2011.[4] This rule does not apply to our study because the sample period is limited to 2005–10, for which the assumption that capital gains are tax-exempt holds true. The possibility of differences in the tax system can influence dividend policy.

Third, the payment of dividends depends on company policy and its financial position. There are no specific rules in Pakistan that make dividend payments mandatory. This can raise the agency problem because managers may decide to omit dividend payments and invest these FCFs in low-cost capital projects. This is done to serve their own interests because managers are often evaluated on the basis of the firm's annual sales growth.

Finally, Pakistan's financial market is greatly influenced by the agency problem because of weak corporate governance arising from ownership structures. Most Pakistani firms have one primary owner who holds majority shares in the affiliated firms. This influences dividend policy, creating an agency problem between the minority shareholders and majority owners. Pakistani firms are often family-owned and liable to ignore outsider or minority interests associated with payouts, which eventually leads to a conflict. This factor affects the firm's dividend-smoothing behavior in the capital market.

3. Literature Survey on Corporate Dividends Policy

Gill, Biger, Mand, and Shah (2012) compare the determinants of dividend policy in the US manufacturing and services sector. Their results show that payouts in the services industry depend on profit margins, sales growth, and debt-equity ratios. However, for manufacturing firms, payouts are a function of profit margins, market-to-book ratios, and tax implications.

[3] Ahmad and Javid (2009) present evidence for this as does the Federal Board of Revenue website.
[4] The government extended this to 2010 such that no capital gains tax was collected on stocks in Pakistan prior to 2010.

Denis and Osobov (2008) analyze dividend polices in different countries over 1989 to 2002. In the US, Canada, UK, Germany, France, and Japan, larger and more profitable firms are more likely to pay higher dividends. Outside the US, however, there is little evidence of a positive relationship between dividend paying and nonpaying firms. Renneboog and Szilagyi (2008) compare European firms paying lower dividends with market-oriented American firms. They find that the payouts of Dutch firms were lower because they tended to use their power against shareholder provisions.

Baker and Wurgler's (2004) catering theory suggests that the firm's managers should give incentives to its shareholders according to their demands. They should cater to investors in their best interest by paying out smooth dividends when the latter puts a premium on dividend-paying firms and by not paying out dividends when investors prefer nonpaying firms. Skinner and Soltes (2011) investigate payout policies with respect to earnings quality, which does not change over time. Their sample consists of all firms listed on the NYSE (except utilities and financial firms) between 1974 and 2005. Their paper finds that firms that were paying dividends were less likely to report losses: investors tended to invest in those firms that showed a regular pattern of giving dividends.

This leads to information asymmetry, which, as DeAngelo, DeAngelo, and Skinner (2008) argue, implies the need to distribute FCF. Their results suggest that agency costs and security valuation problems are explained well by the main features of payout policies, using Lintner's (1956) model. Another cost involved is agency cost and DeAngelo and DeAngelo (2006) use a sample of 22 large private firms to show how dividend payments can prevent significant agency problems – firms with relatively high retained earnings are more likely to pay dividends. They test this on publicly traded industrial firms; the results between the payment of dividends and the ratio of retained earnings are highly significant.

Khang and King (2006) examine the implications of asymmetric information and find that firm insiders take informational advantage in trading shares. This affects the firm's dividend policy. Using a sample of companies for 1982–95, they find that, the higher a firm's dividends, the lower will be insider gains.

Dividends also involve large costs in terms of premium tax, the cost of risk, and opportunity cost. Cohen and Yagil (2008) address the negative relationship between the expected dividend per share (DPS) and the ratio of information on the cost of the dividend held by "category" investors and

arbitrageurs. Their results imply that dividends depend on their short-term and long-term impact on stock prices as well as on financial leverage and investment opportunities.

Farinha (2003) analyzes the agency problem of corporate dividend policy in the UK. His findings suggest that paying shareholders in cash helps reduce the agency problem in two ways: (i) by increasing external capital or (ii) by reducing the FCF. Based on data for two five-year periods (1987–91 and 1992–96) for a sample of 600 firms, he finds a strong relationship between dividend payouts and insider ownership in the UK.

Faulkender and Wang (2006) test the marginal value of corporate cash holdings that arises from the difference in dividend policy. By examining the variations in stock returns, the study finds that cash values decline with higher leverage so that firms choose cash distribution to repurchase stocks. The data is analyzed using semi-quantitative predictions of cross-sectional variations.

Kumar (2006) examines the possible relationship between ownership structure, corporate governance, and dividend payout policy in India's emerging market. Based on a sample of 2,575 firms listed between 1994 and 2000, the results show that ownership is a significant variable in determining firms' dividend policy. Institutional owners are found to have an inverse relationship with dividends and no evidence is found in favor of foreign ownership and dividend payout growth.

In the context of Pakistan, Imran (2011) tests the determinants of dividend payouts for a sample of 36 engineering firms from 1996 to 2008. The results show that the size of the firm, earnings per share, cash flow, ownership structure, and previous DPS all have a significant impact on dividend payouts in this sector.

Afza and Mirza (2011) test the impact of institutional shareholding on corporate dividend policy for 120 companies over the period 2002 to 2007. Their results indicate a positive relationship between institutional ownership and return on equity (ROE), and a negative relationship with sales growth. In an earlier study, Afza and Mirza (2010) test the impact of ownership structure and cash flow on corporate dividend policy, based on a sample of 100 firms listed on the Karachi Stock Exchange (KSE) during 2005–07. Their results show that managerial and individual ownership, cash sensitivity, firm size, and leverage are negatively related to cash dividends.

Ahmad and Javid (2009) find that profitable firms pay larger dividends than small firms, and that leverage and growth opportunity have a negative relationship with dividend payouts. These results hold for a sample of nonfinancial firms listed on the KSE from 2001 to 2006. However, when Ahmad and Javid (2010) test for ownership structure using the same data, they find that concentration within the management and individuals has a negative impact on dividend payouts.

Nazir, Nawaz, Anwar, and Ahmed (2010) investigate the role of dividend policy in determining the volatility of stock prices in Pakistan. The study applies fixed effects and random effects to panel data for a sample of 73 firms listed on the KSE for the period 2003–08. The results imply that dividend policy has a strong, significant relationship with stock price volatility in the KSE.

Finally, Asghar, Shah, Hamid, and Suleman (2011) attempt to determine the impact of dividend payouts on stock prices. They use data for a sample of nonfinancial firms across five sectors (chemicals, cement, sugar, engineering, and synthetic fibers) for the period 2005–09. The results show that dividend payouts and dividend yield are significantly and positively correlated with price volatility and firm size.

4. Research Methodology

This paper explores the main factors influencing dividend policies among nonfinancial firms in Pakistan. The sample includes all profitable firms that were paying dividends during 2005–10. Firms that had incurred losses, i.e., whose net income was negative, during the sample period were excluded. Also, all those nonfinancial firms that had not missed a single dividend payment over the entire sample period were also included.

In general, dividend-paying firms are those that are transitioning from growth to maturity, where the payment of dividends is a unique feature of the business cycle. This is because mature firms have access to fewer positive NPV projects and ample cash reserves, which makes distribution desirable for financial managers. It also makes dividends sticky, while frequent changes in payout send a negative signal to investors (see Myers & Majluf, 1984; Damodaran, 1989; Moyen, 2004). Therefore, to assess the determinants of dividend payments from firm fundamentals, it is critical to discriminate between firms that pay dividends and those that do not. Otherwise, the results will be biased toward the firm's lifecycle.

Finally, Pakistan is unique in that firms' retained earnings are also taxed, pushing more companies into paying dividends as early as possible. This underscores the need to distinguish between dividend-paying and nonpaying firms. We take into account the total sum paid to shareholders as either cash dividends or stock dividends.

Our sample consists of 75 nonfinancial companies listed on the KSE 100 index. The main data was collected through companies' annual reports for 2005–10, with a total of 450 observations. We run a fixed effects regression model on the panel data.

4.1. Dependent and Independent Variables

The two dependent variables are dividend yield and the dividend payout ratio. The dividend yield is the amount of DPS according to the firm's average price. The average price of the stock is calculated based on its price at the beginning of the year and at the end. This formula allows us to test investors' perceptions and expectations concerning the firm's share value. The DPS is the return a shareholder earns on one share. Dividend yield indicates how much a firm will pay in dividends (cash or stock) as a percentage of its shareholders' investment over the course of a year. Thus, it measures how much cash flow an investor receives for each dollar invested in an equity position.

The dividend yield is estimated as follows:

$$DY = \frac{DPS_t}{P_{avg,\ t}}$$

where DY_t is the dividend yield of a firm at the end of year t, DPS is the dividend per share (cash or stock dividend or both), and $P_{avg,\ t}$ is the average price of a firm's stock after dividends are announced at time t.

The second dependent variable is the dividend payout ratio, calculated as the ratio of total dividends paid to shareholders to the firm's net earnings (profits). This variable tests the impact of the firm's characteristics when making a financial decision, and highlights the relationship between net income and dividend payments to shareholders. The dividend payout ratio is estimated as follows:

$$PY_t = \frac{Div_t}{NI_t}$$

where PY_t is the payout ratio at the end of year t, Div_t represents the total dividends (both cash and stock dividends) paid to shareholders, and NI_t is the firm's net income at time t. This variable helps determine the amount of dividends, whether cash or stock dividends or both, paid to shareholders according to the firm's net income. Since loss-making firms are excluded from the sample, the variable checks the impact of dividend payments made by profitable firms. The payout ratio is sensitive to profitability and dividend yield is sensitive to changes in share prices. Dividend yield indicates the rate of return in the form of cash dividends paid to shareholders, but the dividend payout ratio shows how much of a company's net earnings are paid out as dividends.

The first independent variable is the market-to-book (M/B) ratio, which is most commonly used to test the growth opportunity available to a firm. It has a negative effect on both dependent variables because larger companies with a higher M/B ratio tend to pay lower dividends. The greater the investment opportunity available to the firm, the more retained earnings it will need to avail the opportunity. "Growth" firms, therefore, pay their shareholders smaller dividends. Most such firms rely on internal financing in order to avoid the high cost associated with external financing. The ratio is written as:

$$MBV_t = \frac{MV\ of\ equity}{BV\ of\ equity}$$

where MBV_t is the ratio of the market-to-book value of equity in period t. The market value of equity is calculated by multiplying the number of shares outstanding into the market price (taken from the KSE website). The book value of equity is taken as the total equity presented in the firm's balance sheet at the end of year t.

The second independent variable is ownership structure, the first category of which includes shares held by institutional investors such as banks and insurance companies. Institutional owners are expected to have a negative effect on both dependent variables mainly because such firms tend to pay dividends in order to reduce the cost of agency conflict. This is similar to the FCF hypothesis, which states that any FCF in the hands of the management should be distributed among shareholders to reduce agency cost (Jensen, 1986; Rozeff, 1982). Highly concentrated institutional ownership, such as shares held by banks, has a negative effect on dividend payouts (Renneboog & Szilagyi, 2008) due to the securitization of a bank's debts (loans). Most banks invest their FCF in different types of assets to secure their financial obligations and maintain their financial position in

the market (Al-Malkawi, 2007). As a result, such institutions discourage dividend payments (Afza & Mirza, 2011).

The second category of ownership structure includes insider owners – family-owned firms or majority shares held by the management. This has an inverse impact on the dividend payout ratio (Afza & Mirza, 2010). Family members are heavily compensated in the form of high salaries, which increases the firm's expenses such that its net earnings are too low (or even negative) to pay out any dividends (Afza & Mirza, 2011). Another reason for this negative relationship is that managers are reluctant to distribute cash to shareholders (Jensen, 1986), preferring to keep these FCFs to meet their own interests (such as investing in negative NPV projects in order to gain fringe benefits).

The third category of ownership structure comprises shares held by individual investors categorized as agents or brokers or retired civilian officers. This variable usually has a negative effect on dividend yield and the payout ratio (Asghar et al., 2011), mainly due to tax treatment (Miller & Modigliani, 1961). Individuals are more interested in capital gains than in dividends because the former are tax-exempt while dividends are subject to double taxation (Miller & Scholes, 1978).

As mentioned earlier, Pakistan's tax system is different from that of developed markets: a 10 percent withholding tax is deducted from dividend income and a 35 percent corporate income tax is levied on firms that do not announce their dividends for a particular year. Since dividends are subject to double taxation, investors tend to rely on capital gains, which are tax-exempt (for the study period). Investors' low preference for dividend payouts means that a higher proportion of individual investors among the firm's shareholders will have a negative relationship with the dividend payout and with dividend yield.

So, ownership structure is estimated as the number of majority shareholders (taken from firms' annual reports). This comprises the proportion of shares held by (i) institutional investors (banks, pension funds, mutual funds, insurance companies, foreign companies, and investment firms), (ii) family members or the firm's management, and (iii) individual investors (agents, dealers, and retired civilians).

The third independent variable is firm size, which is likely to have a negative effect on dividend yield and dividend payout. Larger firms have greater liabilities and thus retain their excess cash (Lintner, 1956). Nasir et

al. (2010) find that the size of a firm is positively related to the dividend payout ratio: the larger the firm, the more stable its operations cash flow will be and the more likely that it will pay dividends to its shareholders. Another reason is that larger companies are more diversified and need to maintain a reputation of financial wellbeing in the market by paying out smooth dividends to their investors (Asghar et al., 2011). Thus, large firms tend to pay more dividends to their shareholders rather than investing in assets. Firm size is measured as the logarithm of total assets:

$$SZ_t = Log(TA)_t$$

where SZ_t is the size of the firm at time t and $Log(TA)_t$ is the logarithm of total assets at time t. By taking the logarithm, we eliminate any variations (outliers) present in the data.

The fourth independent variable is sales growth. Afza and Mirza (2011) establish a positive relationship between sales growth and dividend payouts. They find that firms able to generate sales are more likely to reward their shareholders. This variable has both a positive as well as negative relationship with dividend yield and the payout ratio. Sales growth is measured as the percentage change in sales:

$$SG_t = \frac{CS_{t-1} - PS_{t-1}}{PS_{t-1}}$$

where SG_t represents sales growth at time t, and CS_t and PS_{t-1} are current sales at time t and previous sales at time $t-1$, respectively.

The fifth independent variable is financial leverage, which usually has a negative relationship with dividend payout as well as with dividend yield. Generally, firms with higher leverage try to increase their retained earnings in order to decrease their dependency on external financing. Such firms pay lower dividends to avoid the cost of raising external capital (see Rozeff, 1982; Jensen, 1986), where they would have to pay a fixed financial charge and interest, and repay the principal amount; firms that were unable to repay their debts would end up liquidating their assets. In order to maintain their liquidity position and cash flow, highly leveraged firms avoid making dividend payments. Financial leverage is measured as:

$$LEV_t = \frac{TL_t}{TA_t}$$

where LEV_t is total leverage estimated at time t, and TA_t and TL_t are total assets and total debt in period t, respectively.

The two independent variables used as determinants of dividend policy are Return on Assets (ROA) and Return on Equity (ROE). These profitability ratios have a positive impact on both dependent variables (dividend yield and dividend payout ratio). Firms with positive earnings tend to pay higher dividends and firms with higher profitability have stable earnings over time and can easily afford to distribute large FCFs as dividends. Thus, we expect ROE and ROA to be positively related to dividend yield and the dividend payout ratio.

The profitability ratios are estimated as follows:

$$ROA_t = \frac{NI_t}{TA_t}$$

$$ROE_t = \frac{NI_t}{OE_t}$$

where ROA_t and ROE_t are the firm's return on assets and return on equity at time t, respectively. NI_t, OE_t, and TA_t are the firm's net income, total owners' equity, and total assets in period t, respectively.

4.2. Model 1

In the first model, all the independent variables are tested against dividend yield (with fixed effects). These variables test the impact of the profitability ratios, growth opportunity ratios, such as the M/B ratio and sales growth, leverage, firm size, and ownership concentration on dividend yield. The following regression model (with fixed effects) is applied to the panel data:

$$DY_{it} = \beta_0 + \beta_{1t}OWN_{inst,it} + \beta_{2t}OWN_{f,it} + \beta_{3t}OWN_{idv,it} + \beta_{4t}LEV_{it} + \beta_{5t}SG_{it} + \beta_{6t}ROE_{it} + \beta_{7t}ROA_{it} + \beta_{8t}MBV_{it} + \beta_{9t}\log(TA)_{it} + \beta_{10t}\{\log(TA)_{it}\}^2 + \beta_{11t}\{OWN_{inst,it}\}^2 + \beta_{12t}\{OWN_{idv,it}\}^2 + \beta_{13t}\{OWN_{f,it}\}^2 + \varepsilon_{it} \quad (1)$$

t = 1, 2, 3 … 6 (2005 to 2010)

DY is the dividend yield at time t, SG is sales growth, and OWN is ownership structure where OWN_{inst} is the ownership concentration held

by institutional investors at time t, OWN_f is the ownership concentration held by the family or management, and OWN_{idv} is the ownership concentration held by individual investors at time t. MBV is the M/B ratio, SZ is the log of total assets representing firm size at time t, LEV is the leverage or total debt held by the firm, and ROA and ROE are the profitability ratios. The model also includes the square terms of size and ownership (institutional, family, and individual).

4.3. Model 2 (Fixed Effects)

The second model tests the significance of the independent variables against the dividend payout ratio (with fixed effects):

$$PY_{it} = \beta_0 + \beta_{1t}OWN_{inst,it} + \beta_{2t}OWN_{f,it} + \beta_{3t}OWN_{idv,it} + \beta_{4t}LEV_{it} + \beta_{5t}SG_{it} + \beta_{6t}ROE_{it} + \beta_{7t}ROA_{it} + \beta_{8t}MBV_{it} + \beta_{9t}\log(TA)_{it} + \beta_{10t}\{\log(TA)_{it}\}^2 + \beta_{11t}\{OWN_{inst,it}\}^2 + \beta_{12t}\{OWN_{idv,it}\}^2 + \beta_{13t}\{OWN_{f,it}\}^2 + \varepsilon_{it} \quad (2)$$

t = 1, 2, 3 … 6 (2005 to 2010)

PY is the dividend payout at time t, SG is sales growth, and OWN is ownership structure where OWN_{inst} is the ownership concentration held by institutional investors at time t, OWN_f is the ownership concentration held by the family or management, and OWN_{idv} is the ownership concentration held by individual investors at time t. MBV is the M/B ratio, SZ is the log of total assets representing firm size at time t, LEV is the leverage or total debt held by the firm, and ROA and ROE are the profitability ratios. The model also includes the square terms of size and ownership (institutional, family, and individual).

5. Empirical Results and Analysis

Table 1 reports descriptive statistics (including the mean and standard deviation) for all the variables described in Section 4 for the period 2005–10. We see that the dividend yield follows a stable trend while there is a slight increase in the payout ratio. Financial leverage, ownership structure, and growth opportunity ratios are stable over time. This may be because industry was stable overall during this period, with no expansion having taken place due to the ongoing recession. The overall trends of central tendency and dispersion show that the dividend yield increases from 2005 to 2008.

Table 1: Descriptive statistics, 2005–10

Variable	Mean	Standard deviation
DY	0.06	0.14
PY	0.70	3.85
ROA	0.08	0.46
ROE	0.19	0.55
LEV	0.52	0.22
SG	0.27	0.56
MBV	1.70	2.15
SZ	7.62	1.42
OWN_i	0.49	0.26
OWN_{idv}	0.17	0.12
OWN_f	0.34	0.27

Note: N = 450.
Source: Authors' calculations.

The payout ratio, ROA, firm size, and the M/B ratio follow a decreasing trend for one year, after which they remain fairly stable throughout the sample period. Financial leverage clearly shows a downward trend, which means that most firms were able to repay their debt over this time. ROE shows a positive trend throughout the period.

Table 2 gives the results of the fixed effects (panel data) regression analysis of the profitability ratios, growth opportunity, firm size, financial leverage, and ownership structure vis-à-vis dividend yield. The empirical results reveal a strong relationship between the size of the firm, its profitability, and sales growth. ROA and ROE have a positive and highly significant impact in determining dividend yield. The coefficients of these variables are positive, which shows that firms able to maintain their profits are more likely to pay out dividends to shareholders.

Table 2: Regression model of dividend yield for panel data (fixed effects), 2005–10

Variable	β_t	SE	$t\ (\beta_t)$	p-value
β_0	0.200	0.19	1.04	0.30
OWN_i	-0.130	0.16	-0.81	0.42
OWN_f	-0.100	0.13	-0.74	0.46
OWN_{idv}	-0.110	0.15	-0.72	0.47
LEV	0.004	0.02	0.19	0.85
SG	0.020	0.01	2.99	0.00***
ROE	0.020	0.00	5.05	0.00***
ROA	0.010	0.00	3.42	0.00***
MBV	-0.004	0.01	-0.77	0.44
SZ	-0.040	0.00	-2.04	0.01***
SZ^2	0.830	0.00	2.34	0.02**
OWN_i^2	0.090	0.16	0.31	0.76
OWN_{idv}^2	-0.120	0.32	-0.88	0.37
OWN_f^2	0.180	0.14	0.79	0.43
Adj. R^2	0.158			
DW	1.350			

Note: *** = significant at 99%, ** = significant at 95%.
Source: Authors' calculations.

A positive coefficient means that both the independent and dependent variables are moving in the same direction: If the firm is profitable, it is more likely to pay dividends. If the firm generates enough operating cash flows from its sales, it will earn a higher net income, which implies higher profitability and stable earnings over time. In turn, this allows the firm to afford a larger FCF to be distributed as dividends. Thus, only profitable firms can maintain their FCFs and disburse these in the form of dividends. This significance is tested at 99 percent; at a 1 percent level of significance, profitability ratios have a highly significant impact on dividend yield.

The impact of firm size is significant at 99 percent, but has a negative slope. The square term of size is also significant at 95 percent, indicating that, when making a decision regarding dividends, firms take their size into account. The negative coefficient indicates that, the larger the firm, the more likely it will retain cash flows to avoid any discrepancies. In Pakistan's case, large firms tend to have greater liabilities or extended

operations than smaller firms. In order to secure their operations and cash flows, they invest more in assets. As the size of the firm increases (denoted here by its total assets), the less likely it will generate a dividend yield.

The impact of sales growth is positive and highly significant at 99 percent. This result implies that Pakistani firms that had the chance to expand their business and increase sales still managed to reward their shareholders. Most firms in the sample had stagnating sales prior to 2005, given the ongoing economic and political crisis. Between 2005 and 2010, however, many firms were able to increase their sales. In order to maintain their market reputation, firms need to increase and sustain their sales growth: only those that could were able to pay dividends to their shareholders. The significance of this variable clearly indicates the importance of the signaling effect. The higher its sales, the greater the firm's profitability, and the more likely that it will have enough cash available to distribute among shareholders.

Finally, the Durbin–Watson (DW) statistic (Table 2) is 1.35 (less than 2), which indicates the presence of positive serial correlation, i.e., the disturbances are serially correlated.

Table 3 presents the empirical results of the second model with fixed effects, which tests the independent variables (profitability ratios, firm size, growth ratio, ownership structure, and financial leverage) against dividend payout. The significant independent variables in the first model (dividend yield) are also highly significant in the second, barring sales growth. Profitability ratios, ROA, and ROE are highly significant at 99 percent. Their coefficients are positive, which suggests that, the more profitable a company, the greater its chances will be of dividend payouts. Firms that are certain about their present and future earnings tend to make dividend payouts to their shareholders to maintain a certain level of business confidence.

The impact of firm size is also highly significant with respect to dividend payouts at 99 percent. It has a negative slope, which indicates that larger firms are more likely to retain FCFs than to pay dividends. Thus, firms with more assets and extended operations are less likely to pay out dividends. Larger firms tend to need greater cash flows than smaller firms to maintain their extensive day-to-day operations. The squared term of size has no impact on the payout ratio.

Table 3: Regression model of dividend payout for panel data (fixed effects), 2005–10

Variable	β_t	SE	$t\ (\beta_t)$	p-value
β_0	3.190	8.30	0.38	0.46
OWN_i	-1.780	0.55	-3.23	0.00***
OWN_f	-1.800	0.66	-2.72	0.01***
OWN_{idv}	-2.400	0.64	-3.78	0.00***
LEV	-0.390	0.26	-1.51	0.13
SG	0.010	0.04	0.31	0.75
ROE	0.090	0.01	7.73	0.00***
ROA	0.100	0.01	17.07	0.00***
MBV	-0.040	0.00	-9.01	0.00***
SZ	-0.080	0.00	-19.57	0.00***
SZ^2	-0.250	0.06	-0.72	0.47
OWN_i^2	-0.170	4.35	-0.56	0.56
OWN_{idv}^2	-0.090	8.77	-0.65	0.52
OWN_f^2	0.210	3.91	0.89	0.38
Adj. R^2	0.1902			
DW	1.850			

Note: *** = significant at 99%, ** = significant at 95%.
Source: Authors' calculations.

The growth opportunity available to the firm is measured by the M/B ratio. In the dividend yield model, sales growth is significant, whereas in the dividend payout model, sales growth is not, although the M/B ratio is highly significant at 1 percent. It has a negative coefficient, which suggests that firms with an opportunity to expand operations tend to retain excess cash flows. As discussed earlier, larger firms usually need a higher cash flow than smaller firms to maintain their day-to day-operations and thus maintain a certain level of cash. This is why firm size and the M/B ratio have a negative impact on payouts: such firms save an excess cash flow by avoiding dividend payouts.

Ownership structure is highly significant with respect to the payout ratio, but has a negative coefficient, which implies that a high concentration of institutional ownership reduces dividend payouts, primarily because the firm's debts (loans) are securitized. Such institutions invest in some form of assets or reserves, which they maintain at the expense of low dividend payouts. Most banks invest their FCF in different types of assets to secure their liabilities and maintain their financial position in the market,

thus avoiding any dividend payments. This variable is highly significant at 99 percent, although its square has no impact on the payout ratio.

Firms with a high concentration of shares held by family members or the management itself are likely to pay significantly fewer dividends. When this category of owners is compensated in the form of high salaries, it increases the firm's expenses such that its net earnings may be insufficient to pay dividends. Moreover, managers may be reluctant to distribute any FCF among shareholders because they would rather use it to invest in unprofitable projects (the agency problem). The squared term has no impact.

The third category of ownership structure – shares held by individual investors – has a negative and highly significant relationship with dividend payouts because most individuals prefer capital gains (which are tax-exempt) to dividends (which are subject to double taxation). Tax treatment, therefore, plays an important role for individuals making a decision regarding dividend payouts. The squared term of the independent variable has no impact on payouts. Finally, the DW statistic is 1.85, which indicates the absence of first-order serial correlation.

Table 4 shows that there is no multicollinearity among the independent variables except in the case of ROA and ROE. This is very small, however, and may be because the same net income was used for specific years to calculate both; it does not affect our results significantly.

Table 4: Correlation matrix of independent variables, 2005–10

	ROA	**ROE**	**LEV**	**SG**	**MBV**	**SZ**	**OWN_i**	**OWN_{idv}**	**OWN_f**
ROA	1.000	0.261*	-0.089	-0.019	0.047	0.024	0.044	-0.031	-0.029
ROE	0.261*	1.000	-0.022	-0.055	0.028	-0.051	0.001	0.002	-0.002
LEV	-0.089	-0.022	1.000	-0.015	0.007	-0.045	-0.066	0.038	0.047
SG	-0.019	-0.055	-0.015	1.000	-0.048	0.032	0.064	-0.071	-0.031
MBV	0.047	0.028	0.007	-0.048	1.000	-0.075	-0.032	-0.071	0.061
SZ	0.024	-0.051	-0.045	0.032	-0.075	1.000	0.058	-0.049	-0.035
OWN_i	0.044	0.001	-0.066	0.064	-0.032	0.058	1.000	-0.012	-0.041
OWN_{idv}	-0.031	0.002	0.038	-0.071	-0.071	-0.049	-0.012	1.000	-0.031
OWN_f	-0.029	-0.002	0.047	-0.031	0.061	-0.035	-0.041	-0.031	1.000

Source: Authors' calculations.

6. Conclusion

This study has used a dividend yield model and dividend payout model to measure the determinants of corporate dividend policy in an

emerging market such as Pakistan. Much of the literature supports the validity of these models. The empirical evidence indicates the relevance of dividend models across capital markets, but especially so in emerging capital markets, where investors may react differently to changes in dividend rates or announcements. The study also helps us understand market behavior in this context. Given that dividend decisions are key to any corporation, firms must take every aspect of investor behavior into account.

Our results indicate that ROA and ROE have a positive and highly significant impact on dividend yield in Pakistan. These results are consistent with Grullon, Michaely, and Swaminathan (2002). Firms that have made a profit are more likely to announce dividends that year because they are certain about their prospects and ability to sustain future dividend payments (Ahmad & Javid, 2009). Moreover, firms that generate enough operating cash flows have a higher net income. Higher profits imply stable earnings over time and larger FCFs that can be distributed as dividends (Nazir et al., 2010). Asghar et al. (2011) also support the positive relationship between dividend yield and a firm's earnings.

Firm size is significant, but has a negative effect in Pakistan. This indicates that, when making a decision about dividends, firms take their size into account. The larger the firm, the higher its liabilities, and the more likely it will retain any excess cash. This finding is consistent with Al-Malkawi (2007) and Cohen and Yagil (2008). Larger firms may also retain funds for future business expansion, whereas smaller firms looking to increase market confidence will avoid omitting dividend payments. Asghar et al. (2011) draw a similar conclusion.

Sales growth has a significantly positive impact on dividends in Pakistan. This finding differs from other studies, which argue that sales growth is more likely to encourage firms to retain their FCFs (see Ahmad & Javid, 2009; Afza & Mirza, 2010). We find, however, that most Pakistani firms with greater opportunity for business expansion still manage to pay dividends out of their FCF, thus maintaining their market reputation. Myers and Majluf (1984) argue that firms with higher sales require extra funds to avail investments as the cheapest source of finance, that is, retained earnings. Additionally, mature companies have fewer chances to invest in high-growth projects because they have already grown to the optimum level of an average industrial business (Afza & Mirza, 2011). Such companies have less incentive to expand and thus experience lower growth and incur less capital expenditure.

Ownership concentration significantly affects dividend payouts. The empirical results show that institutional ownership has a significant impact on dividend payouts, with a negative coefficient, implying that a high concentration within institutions reduces dividend payouts. This result is consistent with Ahmad and Javid (2010) and Afza and Mirza (2010). However, our results contradict Faulkender and Wang (2006) and Aghion and Stein (2008), who argue that institutions prefer making dividend payments to avoid the agency problem. This does not hold true for our sample of Pakistani firms.

Family or management ownership structures imply that the firm is likely to pay smaller dividends. Ahmad and Javid (2010) and Afza and Mirza (2011) yield similar results on the premise that firms may earn negative incomes when they pay high salaries to family owners. Shares held by individual investors have an inverse and highly significant relationship with dividend payouts, consistent with Asghar et al. (2011). This result indicates that the tax treatment with respect to dividends plays an important role for individual investors (Miller & Scholes, 1978).

Firm size is also highly significant with respect to dividend payouts. The larger the firm, the more likely it is to retain FCFs rather than giving out dividends in order to avoid any asset liquidation in case of debt repayment problems. Such firms generate funds internally to avoid costly external financing and usually defer gains (dividends) to their investors.

The growth opportunity available to firms was measured by the M/B ratio and was found to have a negative impact which suggests that firms with the opportunity to expand their operations tended to retain excess cash flows to avoid costly external financing (Grullon & Michaely, 2002). Thus, firms rely on internal financing because it is cheaper.

This study aims to help investors identify dividend-paying firms. The significant independent variables we have examined could help new investors establish which firm characteristics they should target: for example, profitability and high sales growth are likely to indicate dividend-paying firms for investors interested in dividend payments. Those interested in long-term gains may want to target firms with a high market-to book ratio and highly concentrated ownership structure.

Our findings could also help financial managers and investors make better decisions regarding dividend policy, and eventually maximize their returns. This includes identifying which significant factors affect dividend yield and payout ratios for firms in Pakistan, enabling them to design policies that enable dividend-smoothing behavior in the capital market.

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The Value of Export Incentives

Imtiaz Ahmad[*]

Abstract

This study develops a methodology for the comparative analysis of industry-specific export incentives. The impact of different export incentives extended to the textiles sector in India, Pakistan, and Bangladesh is analyzed using industry-level data for the years 2001–11. Our findings show that Bangladesh operates a highly export-oriented regime – of the three countries, the value of its export incentives is highest. The study suggests that, in order to maintain its competitiveness in textile exports, Pakistan needs to enhance its export incentives, particularly for value-added textiles.

Keywords: Exports, export incentives, fiscal incentives, exchange rate, textiles sector, Pakistan.

JEL classification: F00, F13, L50.

1. Introduction

Developing countries have a long history of providing export incentives to reduce the overall tax burden on export incomes, thereby enabling exporters to lower prices without reducing their net profits. Over the years, such incentives have taken several forms, comprising both tax and nontax incentives. These include tax exemptions, export finance schemes, and other measures to facilitate exporters and exporting. Apart from the rationale for enhancing market incentives to attract investment in the exports sector, there are also political motives for export incentives because of which their impact – in terms of economic distortions – is often ignored.

In recent years, export promotion has been the hallmark of most South Asian economies' trade policies. While trade liberalization episodes have generally reduced the anti-export bias, these economies also rely on a variety of direct export measures to facilitate export growth. The overriding principles behind restrictive trade regimes were the protection of domestic industry from foreign competition and the conservation of foreign exchange to support the balance of payments. However, as the

[*] Department of Economics, National University of Sciences and Technology, Pakistan.

South Asian countries transition from development strategies based primarily on import substitution to ones based on export promotion, a number of incentives are being offered to boost exports.

The rationale for using export incentives along with the exchange rate includes, first, the depreciation of the exchange rate, which generally increases the profitability of exports, but runs the risk of leading to more domestic inflation as the prices of essential imports rise simultaneously. Second, the incentive effect is limited in the case of export items that have a high import content. Third, export incentives can be more effective in targeting particular exports, especially emerging and value-added exports.

Export incentives persist as the main ingredient of trade policy. At the same time, they are not subject to strict evaluation primarily because their cost is less visible than that of other export promotion policies that involve explicit budget outlays. This argument is rarely articulated, but it does undoubtedly contribute to the political attractiveness of tax incentives compared to alternatives with a direct budgetary impact, such as subsidies or infrastructure development for industrial zones and others.

Most of the literature on export incentives is linked to the performance of the exports sector and the factors that influence exports. However, the question of competitiveness between different countries' exporting sectors is not addressed in every respect, particularly in the case of developing countries where these incentives act as a "breather" for the exporting sectors. The issue of export incentives becomes more complex when other countries compete for the same export markets by offering a wide range of export incentives, and also because export incentives have a positive impact on exports while causing the government to lose revenue at the same time.

The range of export incentives offered in India, Pakistan, and Bangladesh is broad. It includes cash incentives, lower income tax rates, concessional export finance, zero-rating sales tax, exemption from export duties, and others. The principal purpose of this paper is to compare the export or fiscal incentives given to the textile industries across these three countries, given that they are also competitors in the international export market. The analysis does not utilize traditional measures that involve export shares or relative prices; rather, we have formulated a novel methodology based on measures of competitiveness at the level of a single firm or individual exporter. The comparative analysis will reveal the

advantages and disadvantages to Pakistan's textile industry and highlight possible measures to address them.

2. Export Incentives in Different Countries

Tax incentives – exceptions to the general tax regime – can be defined as any incentive that reduces the tax burden of an enterprise to induce it to invest particularly in export-oriented projects or sectors. Tax incentives include reduced tax rates on income or profits, tax holidays, allowing accelerated depreciation and loss carry-forwards for the purpose of tax accounting rules, lower tariffs on imported equipment, related components and raw materials, and increased tariffs to protect the domestic market and promote investment in import-substituting projects.

Enhancing exports is one of the main priorities of any government because it is expected to raise the momentum of economic growth and development. In pursuing such goals, governments (particularly in developing countries) have a history of offering generous export incentives to sectors that are considered the mainstay of the economy (see Table 1). Fiscal and nonfiscal export incentives end up being much more than a change in relative prices because they can result in key institutional reforms. For example, if export incentives are provided to a sector characterized by significant economies of scale, there is a higher possibility of demand spillovers from one sector to other sectors. It is even possible that these profitable industries might never have been established otherwise in the first place (Rodrik, 1995).

Within manufacturing in India, Pakistan, and Bangladesh, the textile sectors have a sizeable share in total production, export earnings, employment, and capital formation. Therefore, all three governments have tended to provide various incentives to support their textile sectors through duty exemptions, low tax rates, export finance, and others. In most cases, once granted, the efficacy of these fiscal and nonfiscal incentives is not measured. As a result, any questions concerning a comparison of the value of export incentives in different countries remain unanswered.

Table 1: Export incentives in different countries

	Duty drawbacks or tax exemptions on imported inputs	Concessionary export finance	Export insurance and guarantees	Export processing zones	Export performance requirement	Export cash subsidies	Export cartels	Export promotion organizations
India	Yes	Yes	Yes	Yes	Yes	No	No	Yes
Pakistan	Yes	Yes	Yes	Yes	No	No	No	Yes
Bangladesh	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Malaysia	Yes	Yes	Yes	Yes	No	No	No	Yes
Philippines	Yes	Yes	Yes	Yes	No	Yes	No	Yes
Thailand	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Korea, Rep.	Yes	Yes	Yes	Yes	No	No	No	Yes
Singapore	Yes	Yes	Yes	Yes	No	No	No	Yes
Indonesia	Yes	Yes	Yes	Yes	No	No	No	Yes
China	Yes	Yes	Yes	Yes	No	No	No	Yes
Japan	No	Yes	Yes	No	No	No	Yes	Yes

Source: Adapted from Singh (1996), annex II.

3. Literature Review

Export incentives, export promotion, and fiscal incentives to export are an important part of every economy's trade strategy as far as achieving export targets is concerned. These strategies are important to maintain international competitiveness and to increase the productivity of all sectors in general and exporting sectors in particular. However, policies and practices differ across developing and developed countries with respect to their operations and outcomes.

Government strategies to promote exports vary over time and by country according to the needs of exporters and the operation of export systems. India, for example, introduced dramatic policy changes in the 1990s that aimed at improving export performance. Kathuria (1996) examines these policy changes in terms of improvements in export incentives and the elimination of discretionary control in India. The study uses various set-offs and rebates that were provided to exporters in different trade regimes. It compares export profitability across different trade regimes and the difference in domestic and export profitability across the same regimes. The results indicate that export profitability in most export sectors declined under a dual exchange rate regime, while the gap between domestic and export profitability increased because domestic sales were more attractive than export sales. However, this decline in export incentives was reversed under a unified exchange rate regime.

Dholakia, Dholakia, and Kumar (1992) estimate the direct and indirect effects of a unit increase in the demand for exports in terms of gross output, gross value added at factor cost, and the government's net indirect tax revenues. Their analysis of backward and forward linkage coefficients reveals that India's agro-based manufacturing sector needed intensive export promotion as it could generate high incomes without sacrificing its linkage effects to the rest of the economy.

Duty drawback schemes are a major export incentive in all South Asian countries. Mah (2007) examines whether duty drawbacks, which China has used since 1985, have had a significant positive impact on its exports. Applying co-integration tests to an annual dataset for 1979–2001, he finds that duty drawbacks do not promote exports to a significant degree. This may be due to inefficiencies such as false reporting, payment uncertainties, and delayed reimbursement of import duties – all of which are often major problems of the duty drawback system in developing countries.

A similar study by Haque and Kemal (2007) on Pakistan reveals that rebates or refunds have a small positive impact on exports only in the short run.

In trying to determine the appropriate export promotion strategy, Kinnucan, Duffy, and Ackerman (1995) evaluate the effects of price versus nonprice promotion on US cotton prices, domestic use of cotton, exports of cotton, and the cost of cotton programs. The study suggests that nonprice promotion can be an effective way to reduce government costs of farm programs when the advertising elasticity of export demand is high and the own-price elasticity of demand for exports is relatively low. However, if own-price and advertising demand elasticities vary across regions, selective promotion campaigns are more advisable.

It is now commonly recognized that exchange rate management plays an important role in a country's economic growth. The diverse experience of economic growth among both developed and developing countries shows that any significant overvaluation of the exchange rate should be avoided; this is strongly supported by cross-country evidence from Johnson, Ostry, and Subramanian (2007), Reinhart and Rogoff (2004), and Rajan and Subramanian (2011). Well-known studies by Dollar (1992), Sachs and Warner (1995), and Rodríguez and Rodrik (2001), based on economic growth and outward orientation, concur that degrees of overvaluation affect economic growth and exports negatively.

In Turkey's case, Arslan and van Wijnbergen (1993) find that export incentives and the exchange rate contributed 20 percent to real export growth during 1980–87, where exchange rate depreciation was the most influential factor. Abeysinghe and Yeok (1998) show that exchange rate changes have less impact in the case of exports with a higher content of imported inputs. Services, which have a relatively small imported input content, are affected most by exchange rate changes. Export-oriented manufacturing industries are directly and favorably affected by adjustments in the exchange rate. Thus, while it remains one of the most important components of international competitiveness, exchange rate risk is also associated with the slow growth of export-oriented industries (Zia & Mahmood, 2013).

4. Methodology

There are different indicators of competitiveness at the firm, industry, and national level. Traditional measures use relative export shares, prices, and exchange rates. Of the various concepts and measures,

however, comparative advantage is the best defined (Siggel, 2007) to the extent of being considered synonymous with competitiveness. Most other measures have macroeconomic interpretations, which are not always an accurate representation of the situation as in the case of comparative advantage or the real effective exchange rate.

Several assumptions are rarely raised when interpreting these measures. For instance, the standard real effective exchange rate is multilateral and assumes that traded goods are final goods (International Monetary Fund, 2013). Therefore, any conclusions based on this measure must state explicitly that it does not apply to trade in intermediate goods, which often account for a significant portion of overall trade. Similarly, most measures of competitiveness assume that the exports of countries or industries are competing in the same markets, which ignores sources of competitive advantage.

4.1. Evaluation of a Single Export Incentive

We assume that an individual exporter's sources of competitiveness can include the actual cost of inputs, tax expenditures, the cost of finance, and resource allocation decisions. The relative advantage gained through the magnitude of costs and resource allocation can be (i) the abundance (cheapness) of either primary or intermediate inputs (the extended Heckscher–Ohlin model), (ii) the use of different technology (the Ricardo model), (iii) production on a larger scale (the Krugman model), or (iv) any combination of these sources (Siggel, 2007). The profits earned at the level of the individual exporter and industry reflect these sources of advantage, while export incentives can raise profitability and/or enable exporters to offer foreign buyers better prices, thereby increasing the volume of exports.

One way of valuing an export incentive is to find the exchange rate that would yield the same profit in the absence of the incentive. The higher the resulting exchange rate, the greater is the value of the export incentive. A measure of the equivalent exchange rate can, in this way, be estimated for a single good or industry across different countries competing in the same markets.

The most important factor affecting exports is the cost of production, including the import content and foreign prices the exporter has to face. The exporter's net profit, π_N, is given by

$$\pi_N = S - C - F - O - T \quad (1)$$

where S = sales, C = the cost of sales, O = other expenses, F = financial expenses, and T = direct tax paid. These are valued in rupees.

$$C = C_D + C_M$$

where C_D is the cost of domestic inputs and C_M is the cost of imported inputs.

$$S = S_X + S_D$$

where S_X refers to export sales and S_D to domestic sales.

We analyze two regimes: the first with an export incentive and the actual exchange rate, and the second without the export incentive and the equivalent exchange rate, which equalizes the profit earned under the two regimes. The methodology has been developed for the different export incentives being given to textile exporters in India, Pakistan, and Bangladesh (see Table 2). The firm-level data on Pakistan's textiles sector for the period is from the State Bank of Pakistan. The data on India's textiles sector is from the *Economic Times of India* and the sample comprises the top five companies (based on their total assets) in each subsector.

Table 2: Major export incentives in the textiles sector

Pakistan	India	Bangladesh
• Lower tax rate on exports • Concessional export finance • Zero rating of domestic sales	• Lower tax rate on exports • Concessional export finance • Duty drawbacks • Tax holiday (SEZs)	• Cash incentives • Lower tax rate on exports • Concessional export finance • Duty drawbacks • Tax holiday (EPZs)

4.2. Evaluation of Different Export Incentives

In order to analyze the value of each export incentive separately, we determine the equivalent exchange rate in each case using two equations depicting regimes (a) and (b). In each case, the individual exporter's net profit, represented by equation (1), is adjusted to take into account the effect of the export incentive. The detailed methodology for determining the equivalent exchange rate for each incentive is given below.

4.2.1. Cash Incentives

Cash incentives are provided in relation to export proceeds. These are direct disbursements according to the value of exports and, therefore, increase the amount of exports. The equation below illustrates the change in profit under regime (a) in the case of a c percent cash incentive:

$$\pi_N^a = S_X(1 + c\%) + S_D - C_D - C_M - O - \mathrm{F} - \mathrm{T} \quad (2)$$

where c is the amount of the cash incentive.

The profit equation for regime (b) is as follows:

$$\pi_N^b = S_X \frac{\varepsilon}{\varepsilon_0} + S_D - C_D - C_M \frac{\varepsilon}{\varepsilon_0} - O - \mathrm{F} - \mathrm{T} \quad (3)$$

where ε is the equivalent exchange rate and ε_o is the actual exchange rate. By equating the profit equation in regimes (a) and (b), we can work out the equivalent exchange rate that has the built-in effect of the cash incentive.

4.2.2. Presumptive Income Tax

The presumptive tax is deducted at source and is the full and final discharge of tax liability with respect to all exporters (including companies and registered firms) who have no other receipts and source of income. The tax liability is significantly lower than the income tax liable otherwise. Furthermore, such persons are not required to file the prescribed return of income tax, nor is any formal assessment made. They are only required to furnish a simplified statement of their income and presumptive tax.

For a presumptive income tax of $\mathrm{t_p}\%$, the profit model under the two regimes is developed as follows. The net profit before tax under regime (a) will be

$$\pi_N^a = S_X + S_D - C_D - C_M - F - O \quad (4)$$

Further, taxes are apportioned into export taxes and domestic taxes. The tax on exports is given by

$$T_X = \mathrm{t_p}\% \,.\, (S_X)$$

where $\mathrm{t_p}\%$ is the rate of presumptive income tax.

In addition to the presumptive income tax on exports, the exporter must still pay the corporate income tax liable on domestic net profit. In order to measure domestic tax, we need to separate domestic sales from export sales and their relative costs. It is difficult, however, to obtain exact information on how much of the cost of sales, including financial and other expenses, are incurred by domestic sales. We can apportion domestic cost based on the ratio of domestic sales to total sales. The share of domestic cost is written as

$$C_D = \frac{S_D}{S_X + S_D}(C + O + F)$$

Domestic profit before tax = $S_D - (\frac{S_D}{S_X+S_D}(C + O + F))$

Corporate income tax = $\mathrm{t_c}\% \,.\{S_D - \left[\frac{S_D}{S_X+S_D}(C + O + F)\right]\}$

where $\mathrm{t_c}\%$ is the rate of corporate income tax.

Now, the net profit after tax under regime (a) will be

$$\pi_N^a = S_X + S_D - C_D - C_M - F - O - \mathrm{t_p}\% \,.(S_X) - \mathrm{t_c}\% \,.\{S_D - [\frac{S_D}{S_X + S_D}(C + O + F)]\}$$

The net profit after tax under regime (b) will be

$$\pi_N^b = (1-\mathrm{t_c}\%)(S_X \frac{\varepsilon}{\varepsilon_0} + S_D - C_D - C_M \frac{\varepsilon}{\varepsilon_0} - F - O) \quad (5)$$

Again, we can equate the profit models under both regimes and work out the equivalent exchange rate that includes the built-in effect of the presumptive income tax.

4.2.3. Concessional Export Finance

Banks grant concessional finance to exporters on the basis of a firm export order or export letter of credit, for a maximum period of 180 days. The actual incentive would be the difference between the market interest rate and the interest rate on the export finance. It is important to note that the total amount of financing extended by any bank against a firm export order or letter of credit should not exceed the total amount of the firm export order contract or letter of credit.

The net profit in regime (a) will be

$$\pi_N^a = S_X + S_D - C_D - C_M - [F - \frac{(i_m - i_f)S_X}{2}] - O - T$$

$$\pi_N^a = S_X + S_D - C_D - C_M - \left(F - \frac{\Delta i}{2} . S_X\right) - O - T \quad (6)$$

In India's case, where concessional finance is also available for the import of material to be used in exports, the above equation becomes

$$\pi_N^a = S_X + S_D - C_D - C_M - \left(F - \frac{\Delta i}{2} . S_X - \frac{\Delta i}{2} C_M\right) - O - T$$

where i_m is the market interest rate, i_f is the interest rate in the case of an export finance scheme, and Δi is the difference between the market interest rate and the interest rate in the case of an export finance scheme.

The net profit in regime (b) will be

$$\pi_N^b = S_X \frac{\varepsilon}{\varepsilon_0} + S_D - C_D - C_M \frac{\varepsilon}{\varepsilon_0} - F - O - T \quad (7)$$

4.2.4. Zero Rating of Domestic Sales

Zero-rating domestic sales enables exporters, manufacturers, and suppliers to adjust the tax paid on inputs incurred with that of output tax. Producers are allowed to avail this incentive if they are also exporters. When producers have incentive to enter the international market, this increases the exports of the overall industry. Moreover, entering the international market makes them more competitive as their overall cost of production falls. The impact of zero-rated domestic sales is incorporated via the effective tax rate (τ_e).

The net profit model is

$$\pi_N^a = S_X + S_D - C_D - C_M - F - O - T$$

Zero-rating domestic sales such that T = 0 in regime (a) would yield the following form:

$$\pi_N^a = S_X + S_D - C_D - C_M - F - O + \tau_e . S_D \quad (8)$$

The net profit equation in regime (b) is

$$\pi_N^b = S_X \frac{\varepsilon}{\varepsilon_0} + S_D - C_D - C_M \frac{\varepsilon}{\varepsilon_0} - F - O \quad (9)$$

Sales tax in the case of Pakistan is a value-added tax and, therefore, the input tax (on inputs/the cost of goods sold) is deducted from the output tax (on output/sales) to yield the net sales tax payable. The input and output tax rate (t_{vat}) is the same, but in the case of zero-rated sales, the output tax is charged at 0 percent and the taxpayer is entitled to claim the input tax. The true value of the incentive thus depends on the value addition: the higher the value addition, the higher will be the incentive. In this case, the effective tax rate (τ_e) on sales is as follows:

Value added = sales – cost of goods sold[1]

Net tax payable = t_{vat}. value added

where t_{vat} is the rate of value-added tax.

The effective tax rate on sales is $\tau_e = \frac{t_{vat} \times value\ added}{sales}$

4.2.5. Duty Drawbacks

A duty drawback means that, if any duty is paid on the import of goods subsequently used to produce other goods for export, the amount paid as duty on that import will be credited to the exporter.

The profit equation in regime (a) is as follows:

$$\pi_N^a = S_X + D.\left(\frac{C_M}{S_X}\%\right) + S_D - C_D - C_M - F - O - T \quad (10)$$

where the duty drawback $D.\left(\frac{C_M}{S_X}\%\right)$ = (the estimated import duties paid for one year) x (percentage of import components in exported articles).

The net profit equation in regime (b) will be

$$\pi_N^a = S_X \frac{\varepsilon}{\varepsilon_0} + S_D - C_D - C_M \frac{\varepsilon}{\varepsilon_0} - F - O - T \quad (11)$$

[1] The term "cost of goods sold" does not include financial and other costs, but comprises primarily material inputs and labor that are directly associated with the production of the good.

4.2.6. Tax Holiday

In the case of a tax holiday, the exporter need not pay any tax. In India, for example, all industrial units located in special economic zones and export promotion zones are allowed a five-year tax holiday. They can also import goods free of import duty. In such a case, the equation for regime (a) would take the following form:

$$\pi_N^a = S_X + S_D - C_D - C_M + F - O \tag{12}$$

The net profit equation in regime (b) would be

$$\pi_N^b = S_X \frac{\varepsilon}{\varepsilon_0} + S_D - C_D - C_M \frac{\varepsilon}{\varepsilon_0} - F - O - T \tag{13}$$

5. Results and Discussion

The value of an export incentive is calculated in terms of the equivalent exchange rate for made-up textiles, other textiles, and spun, woven, and finished textiles. The difference between the equivalent and actual exchange rates in the case of a particular subsidy indicates the amount of subsidy against US$ 1 of exports.

The total value of export incentives is the aggregate of the value of different export incentives (see Appendix), some of which are the same in Pakistan, India, and Bangladesh (Table 2). However, the value of similar export incentives is different in each country because of different tax rates, interest rates on concessionary export finance, and duty drawbacks as well as the underlying structure of that country's textiles industry. Comparing the subsidies offered to the three sectors enables us to identify the relative size of overall subsidies given to the textiles sectors in these countries. It also reveals whether the magnitude of these subsidies has risen over time (Table 3).

Table 3: Total value of export incentives in Pakistan

(PRs/$)

Category	2001	2005	2009	2010	2011
Made-up textiles					
Equivalent exchange rate	71.6	72.8	94.4	102.2	103.9
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	13.2	13.4	15.9	18.4	18.4
Percentage change	22.6	22.6	20.3	22.0	21.5
Other textiles					
Equivalent exchange rate	70.8	71.5	92.3	97.1	105.8
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	12.4	12.1	13.8	13.3	20.3
Percentage change	21.2	20.4	17.6	15.9	23.7
Spinning, weaving and finishing					
Equivalent exchange rate	62.4	67.4	85.4	95.4	96.4
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	4.0	8.0	6.9	11.6	10.9
Percentage change	6.8	13.5	8.8	13.8	12.7

Source: Author's calculations.

In Pakistan, the value of major government subsidies was PRs 18.4 per dollar of exports in 2011 for made-up textiles alone, having increased from PRs 13.2 per dollar in 2001. The percentage increase in the equivalent exchange rate indicates that it was about 22 percent higher than the actual exchange rate for made-up textiles. Other textiles have enjoyed subsidies of almost the same magnitude. The value of the subsidy for spun, woven, and finished textiles is smaller than that of made-up and other textiles: it was PRs 4 per dollar of exports in 2001 and increased to PRs 10.9 per dollar in 2011. The equivalent exchange rate for this subsector is 12.7 percent higher than the actual exchange rate.

In India, the equivalent exchange rate for the spinning, weaving, and finishing subsector increased to 37.2 percent in 2001 and to 70 percent higher than the actual exchange rate in 2011. The equivalent exchange rate increased to 52 and 44.9 percent higher than the actual exchange rate for made-up and other textiles, respectively. The value of export incentives in India is, therefore, far higher than in Pakistan (Table 4).

Table 4: Total value of export incentives in India

(Rs/$)

Category	2001	2005	2009	2010	2011
Made-up textiles					
Equivalent exchange rate	71.51	65.37	68.41	71.45	71.87
Actual exchange rate	46.70	41.30	46.60	48.60	47.20
Difference	24.81	24.07	21.81	22.85	24.67
Percentage change	53.10	58.30	46.80	47.00	52.30
Other textiles					
Equivalent exchange rate	70.04	54.80	66.31	71.12	68.40
Actual exchange rate	46.70	41.30	46.60	48.60	47.20
Difference	23.34	13.50	19.71	22.52	21.20
Percentage change	50.00	32.70	42.30	46.30	44.90
Spinning, weaving and finishing					
Equivalent exchange rate	64.06	53.63	67.04	78.99	80.24
Actual exchange rate	46.70	41.30	46.60	48.60	47.20
Difference	17.36	12.33	20.44	30.39	33.04
Percentage change	37.20	29.90	43.90	62.50	70.00

Source: Author's calculations.

One way of comparing export incentives in India and Pakistan is to apply Indian export incentives to Pakistan's structure of textiles (Table 5). In this way, the equivalent exchange rate that builds in the impact of Indian export incentives (in Pakistan) can be compared to the equivalent exchange rate that builds in Pakistan's own export incentives. For 2011, the equivalent exchange rate incorporating Indian export incentives for made-up textiles increases to PRs 106.69, which is 24.8 percent higher than the actual exchange rate; it is 21.5 percent higher when Pakistani export incentives are applied for the same period.

For 2011, the equivalent exchange rate increases by 31 and 17 percent, respectively, for other textiles and for spun, woven, and finished textiles compared to 23.7 and 12 percent when Pakistani export incentives are applied. Given that the structure of Pakistan's textiles sector is different from that of India, were we to apply Indian export incentives (with the same rates) to Pakistan's textiles sector, the resulting equivalent exchange rate would also be different from that of India.

Similarly, for 2011, the equivalent exchange rate for made-up textiles that builds in Bangladesh's export incentives increases by 37.5 percent compared to 21.5 percent in the case of Pakistan's own export incentives (Table 6). The equivalent exchange rate that Pakistani exporters would face in other textiles and in the spinning, weaving, and finishing

subsector, given Bangladesh's export incentives, increases by 45.9 and 27 percent, respectively, compared to 23.7 and 12.7 percent when Pakistan's own export incentives are applied.

Table 5: Total value of export incentives when Indian export incentives are extended to Pakistani textiles*

(Rs/$)

Category	2001	2005	2009	2010	2011
Made-up textiles					
Equivalent exchange rate	73.06	75.66	97.77	106.39	106.69
Actual exchange rate	58.40	59.40	78.50	83.80	85.50
Difference	14.66	16.26	19.27	22.59	21.19
Percentage change	25.10	27.40	24.50	27.00	24.80
Other textiles					
Equivalent exchange rate	81.98	73.73	93.00	102.18	112.02
Actual exchange rate	58.40	59.40	78.50	83.80	85.50
Difference	23.58	14.33	14.50	18.38	26.52
Percentage change	40.40	24.10	18.50	21.90	31.00
Spinning, weaving and finishing					
Equivalent exchange rate	61.08	70.50	84.25	98.11	100.73
Actual exchange rate	58.40	59.40	78.50	83.80	85.50
Difference	2.68	11.10	5.75	14.31	15.23
Percentage change	4.60	18.70	7.30	17.10	17.80

Source: Author's calculations.

Table 6: Total value of export incentives when Bangladesh's export incentives are extended to Pakistani textiles

(Rs/$)

Category	2001	2005	2009	2010	2011
Made-up textiles					
Equivalent exchange rate	80.2	82.9	107.2	116.7	117.5
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	21.8	23.5	28.7	32.9	32.0
Percentage change	37.3	39.6	36.6	39.3	37.5
Other textiles					
Equivalent exchange rate	93.3	82.7	103.4	113.4	124.7
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	34.9	23.3	24.9	29.6	39.2
Percentage change	59.7	39.2	31.8	35.3	45.9
Spinning, weaving and finishing					
Equivalent exchange rate	70.4	76.1	95.7	106.1	108.6
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	12.0	16.7	17.2	22.3	23.1
Percentage change	20.6	28.1	21.9	26.7	27.0

Source: Author's calculations.

6. Conclusion and Policy Recommendations

This study has highlighted the major export incentives used to boost export growth. The comparative analysis evaluates individual export incentives in terms of the equivalent exchange rate offered to the textiles sector, which accounts for 87, 53, and 11 percent of exports for Bangladesh, Pakistan, and India, respectively. The results indicate that Bangladesh's textiles sector is the most export-oriented of the three.

The impact of export incentives is highest for Bangladesh's textiles sector. When the same export incentives are applied to the Pakistani textiles sector, the equivalent exchange rates for 2011 are 37.5, 45.9, and 27 percent for made-up textiles, other textiles, and spun, woven, and finished textile exports, respectively. In comparison, the impact of Indian export incentives, when applied to Pakistani textiles, raises the equivalent exchange rate to 24.8, 31, and 17 percent for made-up textiles, other textiles, and spun, woven, and finished textile exports, respectively. The impact of Pakistan's own export incentives on its textiles sector is considerably lower: the equivalent exchange rate rises by 21.5, 23.7, and 12.7 percent for made-up textiles, other textiles, and spun, woven, and finished textile exports, respectively.

Considering the importance of the textiles industry to the country's overall economic health, Pakistan needs to revisit its trade policy for this sector. Over the last few years, the textiles industry has become trapped by severe challenges at home as well as abroad because of increasingly competitive international prices. Pakistan's textiles industry has begun to shift to India and Bangladesh in the face of rising crises, the main reason being the latter's fairly liberal export incentive schemes.

The comparative evaluation of export incentives suggests that Pakistan needs far more liberal export incentives for textiles if it is to compete with its neighbors. This does not necessarily mean that it should match the number and type of incentives given by Bangladesh and India. Whatever incentives the government chooses to offer and structure, it should ensure that (i) the foregone income does not severely undermine government revenues, (ii) the incentives are easily accessible, and (iii) eligibility for these incentives is easily determined.

The following are some key policy implications, with particular reference to Pakistan:

Currently, Pakistan's export incentives scheme is far less liberal compared to India and Bangladesh. Based on our analysis of export incentives, Bangladesh is more competitive than its regional neighbors. However, many other factors also affect competitiveness, including free trade agreements and other export promotion strategies. Given the existing structure of the textiles industry in each of these countries, our analysis suggests that Pakistan needs to enhance its export incentives, particularly for value-added textiles.

Also, export incentives may be preferable to a general depreciation of the exchange rate, which would otherwise increase the prices of essential imports to the detriment of poorer households.

Finally Pakistan needs to rationalize its export incentives regime with a large number of small incentives, even if these incur high transaction costs. This could be done, first, by reducing the presumptive income tax, particularly on value-added textiles, and by eliminating the export development surcharge. A second step could be to provide export cash assistance in lieu of duty drawbacks, R&D subsidies, freight subsidies, and higher energy prices similar to Bangladesh, where cash assistance rates vary from 5 to 25 percent of export proceeds, with the highest rates for export-oriented sectors.

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Appendix

Value of export incentives in Pakistan

Table A1: Estimated equivalent exchange rate for presumptive income tax

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	66.9	69.2	89.2	96.6	96.7
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	8.5	9.8	10.7	12.8	11.2
Percentage change	14.6	16.5	13.6	15.3	13.1
Other textiles					
Equivalent exchange rate	63.6	64.1	83.5	87.9	93.3
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	5.2	4.8	5.0	4.1	7.8
Percentage change	8.9	8.1	6.4	4.9	9.1
Spinning, weaving and finishing					
Equivalent exchange rate	59.1	64.0	80.5	89.9	92.0
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	0.6	4.7	2.0	6.1	6.5
Percentage change	1.0	7.9	2.5	7.3	7.6

Note: tc = 15%, tp = 1%.
Source: Author's calculations.

Table A2: Estimated equivalent exchange rate for concessionary export finance

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	59.1	60.1	79.4	84.8	86.6
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	0.7	0.7	1.0	1.0	1.1
Percentage change	1.2	1.2	1.3	1.2	1.3
Other textiles					
Equivalent exchange rate	59.6	60.2	79.5	84.9	86.8
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	1.1	0.9	1.0	1.1	1.3
Percentage change	1.9	1.5	1.3	1.3	1.5
Spinning, weaving and finishing					
Equivalent exchange rate	59.1	60.0	79.4	84.7	86.5
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	0.7	0.7	0.9	0.9	1.0
Percentage change	1.2	1.2	1.1	1.1	1.2

Note: The difference between the market interest rate and interest rate on export finance is fixed at 2 percent.
Source: Author's calculations.

Table A3: Estimated equivalent exchange rate for zero-rated domestic sales

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	62.5	62.2	82.7	88.4	91.6
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	4.0	2.9	4.2	4.6	6.1
Percentage change	6.8	4.9	5.4	5.5	7.1
Other textiles					
Equivalent exchange rate	64.5	65.8	86.3	91.9	96.7
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	6.1	6.4	7.8	8.1	11.2
Percentage change	10.4	10.8	9.9	9.7	13.1
Spinning, weaving and finishing					
Equivalent exchange rate	61.1	61.9	82.5	88.4	88.9
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	2.7	2.6	4.0	4.6	3.4
Percentage change	4.6	4.4	5.1	5.5	4.0

Source: Author's calculations.

Value of export incentives in India

Table A4: Estimated equivalent exchange rate for zero-rated exports

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	66.48	55.22	59.29	61.06	59.95
Actual exchange rate	46.67	41.35	46.58	48.61	47.19
Difference	19.81	13.87	12.71	12.45	12.77
Percentage change	42.40	33.50	27.30	25.60	27.10
Other textiles					
Equivalent exchange rate	64.81	48.65	58.19	61.53	58.09
Actual exchange rate	46.67	41.35	46.58	48.61	47.19
Difference	18.14	7.30	11.61	12.92	10.90
Percentage change	38.90	17.70	24.90	26.60	23.10
Spinning, weaving and finishing					
Equivalent exchange rate	61.33	48.68	63.22	72.20	70.93
Actual exchange rate	46.67	41.35	46.58	48.61	47.18
Difference	14.66	7.33	16.64	23.59	23.74
Percentage change	31.40	17.70	35.70	48.50	50.30

Note: Exports are zero-rated and credit is available on input tax.
Source: Author's calculations.

Table A5: Estimated equivalent exchange rate for tax holiday

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	47.1	44.6	49.2	54.8	54.0
Actual exchange rate	46.7	41.3	45.3	48.6	47.2
Difference	0.5	3.3	3.9	6.1	6.9
Percentage change	1.0	7.9	8.6	12.6	14.5
Other textiles					
Equivalent exchange rate	47.1	44.6	50.9	54.8	54.0
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	0.5	3.3	4.4	6.1	6.9
Percentage change	1.1	8.0	9.4	12.6	14.6
Spinning, weaving and finishing					
Equivalent exchange rate	46.8	43.3	47.8	51.5	51.8
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	0.1	2.0	1.2	2.9	4.6
Percentage change	0.2	4.8	2.6	6.0	9.7

Source: Author's calculations.

Table A6: Estimated equivalent exchange rate for duty drawbacks

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	48.3	42.4	47.3	49.2	48.1
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	1.6	1.0	0.7	0.6	0.9
Percentage change	3.4	2.4	1.5	1.2	1.9
Other textiles					
Equivalent exchange rate	47.9	41.9	47.3	49.0	47.7
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	1.2	0.6	0.7	0.4	0.5
Percentage change	2.6	1.5	1.5	0.8	1.1
Spinning, weaving and finishing					
Equivalent exchange rate	47.6	42.4	46.9	49.0	47.8
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	0.9	1.1	0.3	0.4	0.6
Percentage change	1.9	2.7	0.6	0.8	1.3

Note: Duty drawback for te0xtiles is fixed at 10 percent.
Source: Author's calculations.

Table A7: Estimated equivalent exchange rate for concessional export finance

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	49.6	47.3	50.6	52.3	51.3
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	2.9	5.9	4.0	3.7	4.1
Percentage change	6.2	14.3	8.6	7.6	8.7
Other textiles					
Equivalent exchange rate	50.1	43.7	49.6	51.7	50.0
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	3.5	2.3	3.0	3.1	2.9
Percentage change	7.5	5.6	6.4	6.4	6.1
Spinning, weaving and finishing					
Equivalent exchange rate	48.4	43.2	48.9	52.2	51.2
Actual exchange rate	46.7	41.3	46.6	48.6	47.2
Difference	1.7	1.9	2.3	3.5	4.1
Percentage change	3.6	4.6	4.9	7.2	8.7

Note: The difference between the market interest rate and interest rate on export finance is fixed at 2.5 percent.
Source: Author's calculations.

Bangladesh's export incentives applied to structure of Pakistani textiles

Table A8: Estimated equivalent exchange rate for cash incentive

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	69.0	70.2	92.8	99.3	101.7
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	10.6	10.9	14.3	15.5	16.2
Percentage change	18.1	18.3	18.2	18.5	19.0
Other textiles					
Equivalent exchange rate	75.3	72.7	94.1	100.6	104.6
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	16.9	13.3	15.6	16.8	19.1
Percentage change	28.9	22.5	19.9	20.1	22.3
Spinning, weaving and finishing					
Equivalent exchange rate	68.4	69.7	92.0	97.9	99.9
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	9.9	10.3	13.5	14.1	14.4
Percentage change	17.0	17.3	17.1	16.9	16.8

Note: Cash incentive = 5 percent of export proceeds.
Source: Author's calculations.

Table A9: Estimated equivalent exchange rate for exempted exports

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	66.9	69.2	89.2	96.6	96.7
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	8.5	9.8	10.7	12.8	11.2
Percentage change	14.6	16.5	13.6	15.3	13.1
Other textiles					
Equivalent exchange rate	63.6	64.1	83.5	87.9	93.3
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	5.2	4.8	5.0	4.1	7.8
Percentage change	8.9	8.1	6.4	4.9	9.1
Spinning, weaving and finishing					
Equivalent exchange rate	59.1	64.0	80.5	89.9	92.0
Actual exchange rate	58.4	59.4	78.5	83.8	85.5
Difference	0.6	4.7	2.0	6.1	6.5
Percentage change	1.0	7.9	2.5	7.3	7.6

Note: 50 percent of the income tax on any income from exports will be exempted.
Source: Author's calculations.

Table A10: Estimated equivalent exchange rate for duty drawbacks

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	60.29	61.40	81.12	86.70	88.46
Actual exchange rate	58.43	59.35	78.49	83.80	85.50
Difference	1.85	2.05	2.63	2.90	2.96
Percentage change	3.20	3.50	3.40	3.50	3.50
Other textiles					
Equivalent exchange rate	59.35	60.13	79.38	84.76	86.59
Actual exchange rate	58.43	59.35	78.49	83.80	85.50
Difference	0.91	0.78	0.88	0.96	1.09
Percentage change	1.60	1.30	1.10	1.10	1.30
Spinning, weaving and finishing					
Equivalent exchange rate	58.84	59.79	79.05	84.36	86.09
Actual exchange rate	58.43	59.36	78.49	83.80	85.50
Difference	0.41	0.44	0.55	0.56	0.59
Percentage change	0.70	0.74	0.70	0.67	0.69

Note: Duty drawback = 5 percent.
Source: Author's calculations.

Table A11: Estimated equivalent exchange rate for tax holiday

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	59.25	60.16	79.64	85.50	87.13
Actual exchange rate	58.43	59.35	78.49	83.80	85.50
Difference	0.81	0.81	1.14	1.69	1.63
Percentage change	1.40	1.40	1.50	2.00	1.90
Other textiles					
Equivalent exchange rate	70.31	63.71	81.92	91.53	96.74
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	11.87	4.35	3.42	7.72	11.24
Percentage change	20.30	7.30	4.40	9.20	13.10
Spinning, weaving and finishing					
Equivalent exchange rate	59.51	60.61	79.70	85.35	87.14
Actual exchange rate	58.43	59.35	78.49	83.80	85.50
Difference	1.07	1.26	1.20	1.55	1.64
Percentage change	1.8	2.10	1.50	1.80	1.90

Source: Author's calculations.

India's export incentives applied to structure of Pakistani textiles

Table A12: Estimated equivalent exchange rate for concessional export finance

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	62.91	63.96	84.51	90.66	93.27
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	4.47	4.60	6.01	6.86	7.76
Percentage change	7.60	7.70	7.70	8.20	9.10
Other textiles					
Equivalent exchange rate	75.07	67.94	91.11	95.03	99.33
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	16.63	8.58	12.61	11.23	13.83
Percentage change	28.50	14.50	16.10	13.40	16.20
Spinning, weaving and finishing					
Equivalent exchange rate	61.65	62.88	84.53	89.29	90.97
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	3.21	3.53	6.03	5.49	5.47
Percentage change	5.50	5.90	7.70	6.60	6.40

Source: Author's calculations.

Table A13: Estimated equivalent exchange rate for duty drawbacks

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	58.74	59.69	78.91	84.29	86.07
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	0.31	0.33	0.42	0.49	0.57
Percentage change	0.50	0.60	0.50	0.60	0.70
Other textiles					
Equivalent exchange rate	59.79	60.10	79.14	84.51	86.55
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	1.35	0.74	0.64	0.71	1.04
Percentage change	2.30	1.20	0.80	0.80	1.20
Spinning, weaving and finishing					
Equivalent exchange rate	58.63	59.59	78.78	84.06	85.76
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	0.19	0.23	0.28	0.26	0.26
Percentage change	0.33	0.39	0.36	0.31	0.30

Source: Author's calculations.

Table A14: Estimated equivalent exchange rate for zero-rated exports

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	68.82	75.46	96.80	104.84	104.04
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	10.38	16.10	18.30	21.04	18.54
Percentage change	17.76	27.12	23.31	25.11	21.68
Other textiles					
Equivalent exchange rate	64.93	72.79	86.77	96.45	102.24
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	6.49	13.43	8.27	12.65	16.74
Percentage change	11.11	22.62	10.54	15.10	19.58
Spinning, weaving and finishing					
Equivalent exchange rate	68.58	73.85	89.07	99.50	102.83
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	10.15	14.49	10.57	15.70	17.33
Percentage change	17.37	24.41	13.46	18.74	20.27

Source: Author's calculations.

Table A15: Estimated equivalent exchange rate for tax holiday

(Rs/$)

Category	2000/01	2004/05	2008/09	2009/10	2010/11
Made-up textiles					
Equivalent exchange rate	59.25	60.17	79.64	85.50	87.13
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	0.81	0.81	1.14	1.70	1.63
Percentage change	1.39	1.36	1.45	2.03	1.91
Other textiles					
Equivalent exchange rate	70.31	63.71	81.92	91.53	96.74
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	11.87	4.35	3.42	7.72	11.24
Percentage change	20.31	7.33	4.36	9.21	13.15
Spinning, weaving and finishing					
Equivalent exchange rate	59.52	60.62	79.70	85.35	87.14
Actual exchange rate	58.44	59.36	78.50	83.80	85.50
Difference	1.08	1.26	1.21	1.55	1.64
Percentage change	1.85	2.12	1.54	1.85	1.92

Source: Author's calculations.

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The Socioeconomic Impact of a Customized Lending Program for Furniture Clusters in Chiniot, Punjab

Sajjad Mubin, Shazia Mudassir Ali, M. Ubaid Iqbal*

Abstract

This study evaluates a Punjab Government development project titled "Customized Lending Program for Furniture Cluster at Chiniot." The project was implemented by the Punjab Government's Small Industries Corporation at a total cost of PRs 40 million: the sum of PRs 100,000 was loaned to 400 small and medium furniture manufacturers in Chiniot, to be repaid in 22 equal monthly installments with a grace period of two months. The socioeconomic impact of the loan was determined from data collected through a survey. Overall, the project was deemed unsuccessful: on average beneficiaries' income fell due to negative factors such as power outages and the fact that uniform loans were made to small and larger manufacturers.

Keywords: Punjab development project, Chiniot, impact evaluation, furniture industry, microfinance, Pakistan.

JEL classification: O10.

1. Introduction

The district of Chiniot in Punjab is well known for producing master-crafted furniture, most of which is produced by artisans known locally as *tarkhans* and *lohars*. Periodically, the government has initiated development projects to improve the quality and quantity of furniture trade in the area. The Wooden Furniture Common Facility Services Centre and Show Room (WFCFSC) was established in 2007 to provide financial and technical assistance to manufacturers in furniture design, wood seasoning techniques, and showroom display. In 2008, the Punjab government initiated a project titled "Customized Lending Program for Furniture Cluster at Chiniot." Under this project, a total of PRs 40 million was made available to furniture manufacturers in the form of instant loans. With a three-year gestation period, the project was designed to provide easy access to credit for Chiniot's small furniture industry through market-driven credit support.

* Planning and Development Department, Government of Punjab, Lahore, Pakistan.

The characteristics of this credit support scheme are as follows (see Punjab, Industries, Commerce, and Investment Department, 2008, 2012):

- Each manufacturing unit was provided a loan of PRs 100,000.
- A one-time processing fee (administrative charges) of PRs 6,000 was charged (at the rate of 6 percent of the loan amount) with no other financial costs.
- The loan was to be repaid in 22 equal monthly installments with a grace period of two months.
- A late payment penalty fee was to be charged at the rate of PRs 500 per month on each installment.
- Extensive documentation was involved in the loan processing as a guarantee of repayment.

The project was executed by the Punjab Small Industries Corporation (PSIC) under the Punjab government at a total cost of PRs 40 million. The selected 400 beneficiaries were small to medium furniture manufacturers. In all, more than 1,000 small, medium, and large units were identified, but larger manufacturers were obviously uninterested in a PRs 100,000 loan, given the small tradeoff involved. No other project dealing with microfinance or any other grant-in-aid or subsidy for budgetary support had been initiated in the previous five years.

Borrowers were identified by the PSIC on the basis of uniform criteria: all were small to medium workshop owners employing, on average, six to eight artisans or workers, most of who were poorly paid or even unpaid, if apprentices. Although PRs 100,000 is not a significant loan amount in this context, constrained funds for development in this sector meant that only PRs 40 million could be allocated to the project. Nonetheless, the amount was deemed sufficient to purchase materials and pay bills and wages to run the business sustainably.

Borrowers used the loan money to purchase wood materials, small tools, and molder machines and to pay their artisans. It was assumed that the loan would help beneficiaries prosper financially and socioeconomically – a hypothesis this study seeks to test.

2. Literature Review

The systematic evaluation of development projects and programs was conceived and formalized in the 1960s by donor agencies to assess

their performance and impact (Baker, 2000). Rossi and Freeman (1993) define evaluation as "the systematic application of social research procedures for assessing the conceptualization, design, implementation, and utility of ... programs." Patton (1997) has introduced utilization-focused evaluations on the premise that evaluations should be judged by their utility and actual use. Mubin, Ahmed, and Sial (2011) argue that the purpose of project evaluation is not fulfilled unless it is critically utilized as feedback in planning and decision-making. The evaluation methodology for this study was developed based on research conducted by Mubin, Ahmed, Ahmed, and Mubin (2013) and Mubin, Ahmed, Mubin, and Majeed (2013).

A wide range of microfinance development projects has been initiated by national and international donor agencies across the developing world, but with mixed results. In Bangladesh, the microfinance model presented by Dr Muhammad Yunus was successfully implemented and reported to be a high-impact intervention. However, in Pakistan, similar results could not be achieved: the microfinance (instant loan) components introduced under the Sustainable Livelihood of Barani Areas Project or the Socioeconomic Impact in Destitute and Neglected Children Families project, for instance (see Sial, 2011, 2012), did not meet their desired targets.

3. Methodology

Apart from improving the financial and socioeconomic wellbeing of small furniture manufacturers in Chiniot, the project was expected to contribute to employment generation and training, thus ensuring the sustainable development of this cluster. For the purpose of this study, we also assume that any sort of socioeconomic impact on the target beneficiaries was solely due to the intervention under study.

Over 3,300 furniture-manufacturing units – most of which rely on fairly basic technology – exist in and around Chiniot. Of these, 400 units that met the identification criteria were financed though this credit support scheme. A single manufacturing unit (furniture workshop) was taken as the unit of analysis. All manufacturing units were selected at random and divided into a treatment group and a control group.

These 400 manufacturing units or subprojects benefited directly from the credit support facilities provided by the project. Their average net income was PRs 10,000 to 40,000 per month, in a few cases approaching

PRs 50,000 or more. Due to time and cost constraints, it was not possible to visit all the manufacturing units in the treatment group. Therefore, 7.5 percent (= 30) manufacturing units were randomly selected out of the total 400 beneficiaries. In order to obtain a representative sample from among all the units, each was assigned a unique number (from 001 to 400), following which a random sample of 30 units was selected electronically using a random number generator.

The survey questionnaire was designed to measure the impact of the project on all the project's components, including loan terms and conditions, employment generation, machinery and equipment, and institutional and implementation support. Table 1 describes the indicators used to measure progress against the project's objectives. The input received from each beneficiary was recorded against the indicators, with Punjabi and Urdu used as the survey medium.

Table 1: Project impact indicators

Indicator	Description
Turnover, income generation, overall impact and satisfaction level of beneficiaries	• Change in annual turnover (before/after) • Income generation (before/after) • Overall impact of loan on business (before/after) • Overall satisfaction level
Education	• Number of children attending school or seminary (before/after) • Monthly expenditure on schooling (before/after) • School type (before/after)
Vehicle ownership	• Number of entrepreneurs who own a (i) loader truck, (ii) Bolan pickup, (iii) car, (iv) motorcycle, (v) bicycle, or (vi) animal-driven cart (before/after)
Machinery type (manual or electrical)	• Number of persons who own a (i) cutter, (ii) molder, (iii) planner, or (iv) electrical equipment (before/after)
Employment generation (paid employees only)	• 0 employees (before/after) • 1–4 employees (before/after) • 4–8 employees (before/after) • 8–12 employees (before/after) • 12 or more employees (before/after)

Indicator	Description
Building ownership	• Own building (before/after) • Family-owned (before/after) • Partnership/rented (before/after) • Others (before/after)
Living standards (basic facilities)	• Owns residence (before/after) • Use of home appliances (fridge, AC, television, computer, washing machine) (before/after) • Electricity, gas, and water (before/after) • Toilet (before/after)

A comprehensive list giving details of each beneficiary – including their name, address, telephone numbers, workshop address, products manufactured, and loan details – was made available. The purpose of visiting these workshops was to verify the information reported. Different features of the project were inspected in order to validate the accruing benefits.

4. Results and Discussion

The most important indicator from the firm's point of view is annual turnover. Our results found that on the case of this project, firms' annual turnover decreased, implying that the project failed from a business point of view. The reasons for this are discussed below.

4.1. Turnover, Income Generation, Satisfaction Level and Overall Impact

Table 2 shows a slight negative trend in respondents' annual turnover before and after the intervention, from an average of PRs 1.179 million to PRs 1.176 million, respectively.

Table 2: Annual turnover before and after project (PRs)

Statistic	Annual turnover pre-2008	Annual turnover post-2012
Mean	1,179,066.67	1,175,853.33
Minimum	24,000.00	36,000.00
Maximum	24,300,000.00	24,300,000.00

Source: Author's calculations

Respondents cited a number of issues that reduced the project's efficacy from their perspective (Table 3), including difficult loan terms and conditions, excessive documentation needed for loan processing, penalties

on late installment deposits, and the fact that a uniform amount (PRs 100,000) was lent across all units, irrespective of business scale (larger units, for example, felt that the loan should have been at least PRs 300,000).

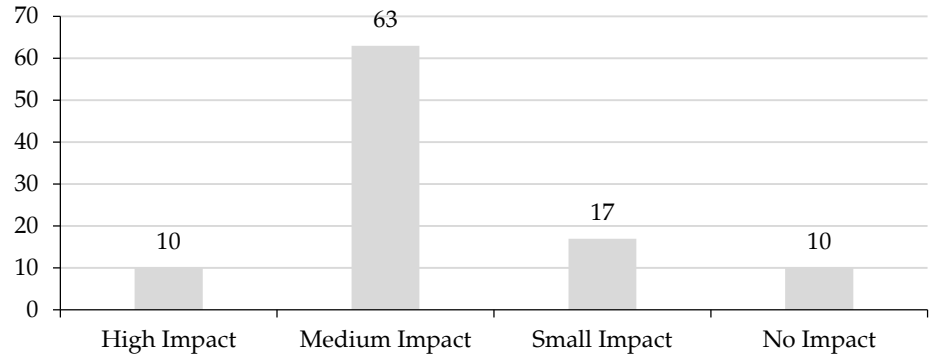
Table 3: Satisfaction with terms and conditions of loan and recovery schedule (percent)

Are you satisfied with the loan terms and conditions, and recovery schedule?	No	Yes
Amount of loan	57	43
Processing fee	47	53
Documentation	63	37
Number of installments	20	80
Penalties (PRs 500/month)	73	27
Customer care	16	84
Processing mechanism/time	83	17
Recovery follow-up issues	26	74
Facilities at center	7	93
PSIC staff are unbiased/employ fair practices	10	90

Source: Author's calculations

As far as any overall improvement in business is concerned, only 10 percent of respondents reported that the loan had had a high impact on business growth. Most respondents (63 percent) felt the project had had a medium impact, while 17 percent and 10 percent indicated little or no impact, respectively (Figure 1).

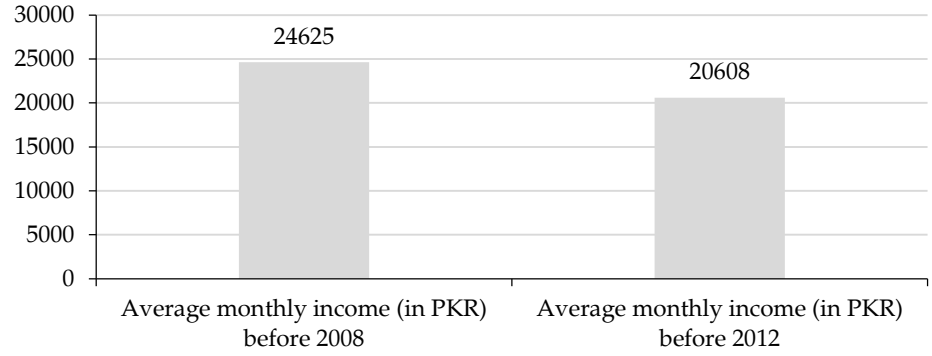
Figure 1: Impact of loan on business



Source: Author's calculations

Additionally, exogenous factors such as constant power outages and, in turn, reduced working hours, meant that many artisans were less productive than expected. This prevented workshops from fully exploiting the benefits of the capital they had been loaned. Figure 2 indicates that the average monthly income of project beneficiaries fell from PRs 24,625 to PRs 20,608 before and after the intervention, respectively.

Figure 2: Change in average monthly income



Source: Author's calculations

Apart from the high cost of power and power outages, some respondents suffered business losses as a result of low-quality raw material, that is, those using sheesham wood found part of their supply to be diseased. Moreover, respondents reported that the loan amount was not enough to purchase more than basic machines such as molders or artisans' tools. Their remaining work was carried out using rented machines, which implied that the cost of production remained led to the project having a negative impact on firm level income.

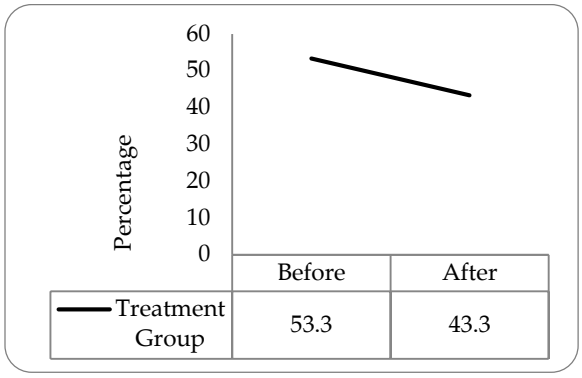
Overall, these factors combined led to the project having a negative impact on firm level income. While it is possible that the project may have had a positive impact in the absence of negative business factors, the fact remains that the loan remained ineffective, with many borrowers finding it difficult to repay their loan installments on time.

4.2. Schooling Choices

The project's impact on education was measured by the number of school-going children on the assumption that families who sent their children to private schools were financially better off than those who sent

their children to government schools. The number of private school-going children per family among project beneficiaries fell from 53.3 to 43.3 percent over the course of the intervention (Figure 3).

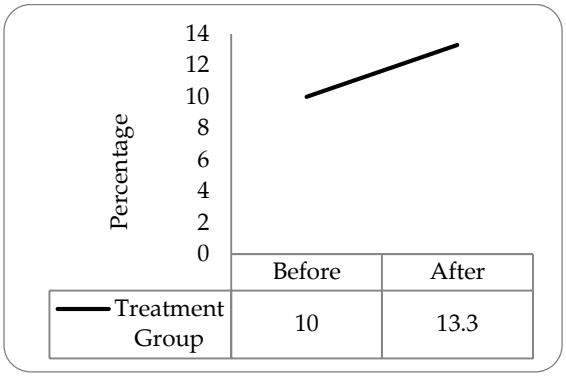
Figure 3: Children attending private schools



Source: Author's calculations

The proportion of children attending government schools, however, increased from 16.6 to 33.3 percent, while that of children attending seminaries rose by 3 percent (Figure 4). This could imply that households' capacity to bear schooling expenditure was reduced. Alternately it is possible that household's confidence in Government School's increased. A rise in seminary enrolment may effect that project beneficiaries were less able to afford to send their children to private or public schools. Our results imply that the microcredit scheme had a negative socioeconomic impact in terms of better schooling choices.

Figure 4: Children attending seminaries

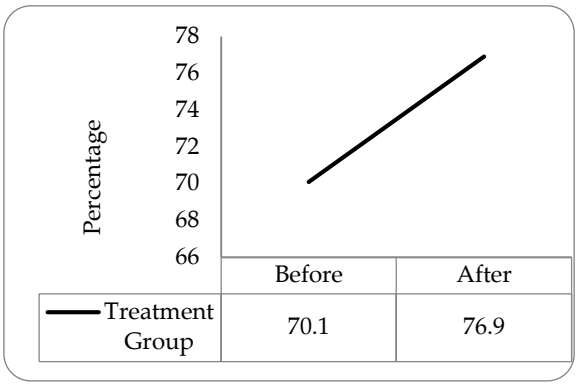


Source: Author's calculations

4.3. Business Logistics and Transportation

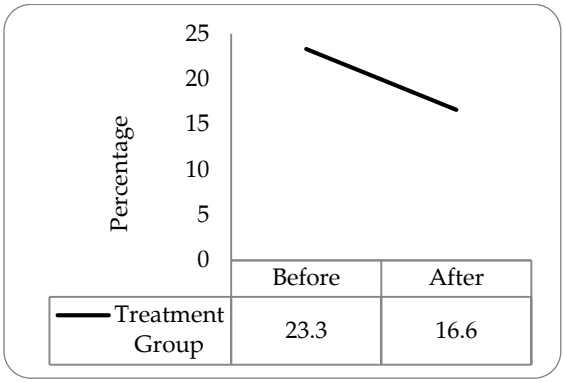
The use of motorcycles rather than bicycles was employed as an indicator of increased business income – and, therefore, of better living standards – among the respondents. Some reported having bought motorcycles or even pickup vehicles to replace their previous modes of transport. About 3 percent owned a loader truck before and after the intervention, indicating no change in business growth. The percentage of beneficiaries using a motorcycle rose from 70.1 to 76.9 percent, while the use of bicycles decreased from 23.3 to 16.6 percent (Figures 5 and 6).

Figure 5: Entrepreneurs who use a motorcycle



Source: Author's calculations

Figure 6: Entrepreneurs who use a bicycle



Source: Author's calculations

4.4. Machinery Type and Ownership

One of the objectives of the credit support scheme was to encourage the use of efficient machinery and equipment in the furniture industry. Ownership of molder machines among project beneficiaries increased from 75.9 to 93.1 percent during the project, while that of planner machines rose from 86.7 to 90 percent. About 43.3 percent of artisans reported using planner machines before the scheme; this rose to 46.7 percent post-intervention. Most respondents said they had used the loan money to buy molder machines because it did not cover the cost of other, more expensive, machinery. The percentage of respondents who had adopted electrical equipment increased from 70 to 73.3 percent during the project.

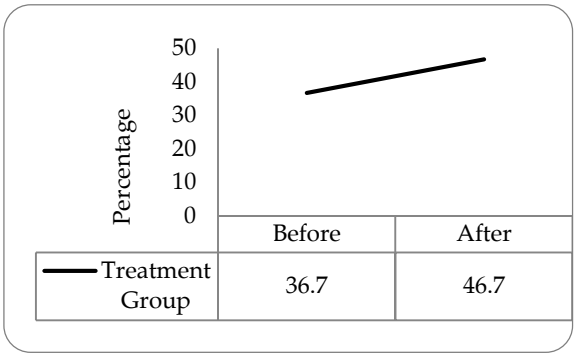
4.5. Employment Generation

A key objective of this project was to generate employment among skilled artisans. The percentage of respondents employing unpaid labor (as apprentices) fell from 16.7 to 10 percent. The percentage of furniture workshops employing one to four paid artisans increased from 46.7 to 73.3 percent, while that of workshops employing four to eight paid artisans remained constant at 26.7 percent before and after the intervention.

4.6. Business Building Ownership

Ownership of workshop premises is key to business growth and stability, contributing to annual turnover and serving as a gauge of capital investment and profit margins. The percentage of furniture manufacturers who owned their workshops increased from 36.7 to 46.7 percent during the project (Figure 7). Conversely, the percentage of manufacturers operating from family-owned workshop premises decreased from 20 to 16.5 percent.

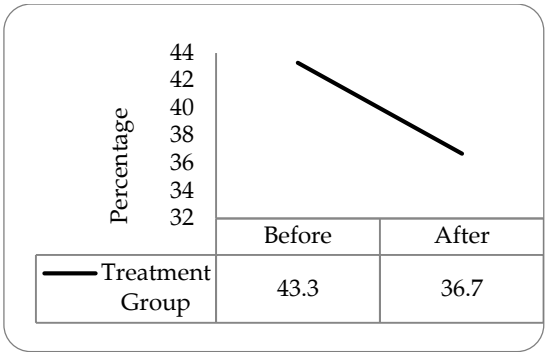
Figure 7: Business building ownership (self-owned)



Source: Author's calculations

The trend of establishing new workshops rather than working from family-owned premises has improved over the years. The study also found that the percentage of furniture manufacturers with rented workshops decreased from 43.3 to 36.7 percent during the project (Figure 8).

Figure 8: Business building ownership (partnership/rented)



Source: Author's calculations

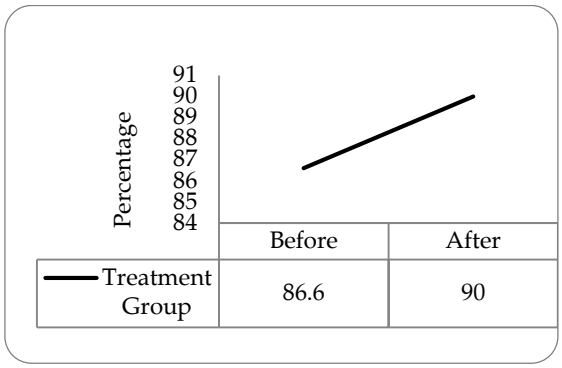
This indicates that such businesses have not grown, with partnerships declining perhaps as a result of limited growth opportunities. In family-owned businesses, beyond a certain level, the entrepreneur's son often becomes an independent entrepreneur as business improves, which serves to decentralize the family business. In this case, however, family dependence has increased, implying limited business growth during the time frame of the project.

4.7. Living Standards and Access to Basic Facilities

Another indicator of business improvement is a rise in living standards, which underscores the indirect impact of the credit scheme on households that benefited from the loan. These indicators include ownership of residence, a vehicle, and home appliances such as an air conditioner, fridge, television, and washing machine. The percentage of respondents living in a self-owned residence increased from 47.6 to 48.5 percent, while that of respondents who owned a vehicle increased from 86.6 to 90 percent (Figure 9). Ownership of home appliances remained constant at 96.6 percent (Figure 10).

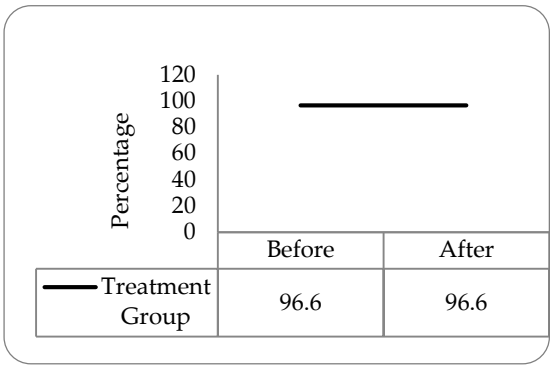
Table 4 shows that despite the significant shortcomings of the project, there were positive increases in some indicators.

Figure 9: Entrepreneurs who own a vehicle



Source: Author's calculations

Figure 10: Entrepreneurs who own basic household appliances



Source: Author's calculations

Table 4: Impact summary of intervention

Indicator	Simple difference/ pre- and post- method
Average annual income of beneficiaries	-7.4
Private school	-10.0
Government school	16.7
Seminary	13.3
Loader truck	0.0
Motorcycle	6.8
Cycle	-6.7
Electric cutter	3.3
Molder	17.2
Planner	3.3
Drill machine	6.7
Unpaid labor	-6.7
Paid labor (1–4 employees)	26.6
Paid labor (4–12 employees)	0.0
Workshop building (self-owned)	10.0
Workshop building (family-owned)	-3.5
Workshop building (rented)	-6.6
Residence (self-owned)	0.9
Transportation (self-owned)	3.4
Use of home appliances	0.0

Source: Author's calculations

5. Recommendations

The results show that the sponsoring and executing agencies concerned need to analyze why the government's project did not achieve its desired economic impact. The story that emerges is that the design parameters and the project methodology need to be improved. The executing agency must also consider why borrowers were not satisfied with the microcredit scheme. Some of the major recommendations based on the results of this analysis are as follows:

First, the loan amount should be more flexible, based on the requirements and credit rating of borrowers, and range from PRs 100,000 to PRs 300,000. The 6 percent processing fee should be reversible at the time of submission of the last loan installment.

Second, the loan process should be made easier and omit the need for unnecessary documentation. The late payment fine should also be removed from the project design and replaced by other ways of ensuring timely loan repayment by beneficiaries.

Third, there is a large gap between the socioeconomic conditions of different scales of furniture manufacturing. Most entrepreneurs are small and not well connected with the bigger markets. For such projects to be efficient, small furniture manufacturers should be targeted first and given preference when disbursing loans.

Fourth, the furniture industry's workforce needed professional training and certification. Credit support or direct subsidiary schemes will not only help improve socioeconomic conditions among craftsmen in the furniture industry of Chiniot, but also preserve cultural heritage and traditional skills.

6. Conclusions

Our analysis of the project yields the following conclusions:

First despite the provision of a customized credit support facility, the annual turnover and average net annual income of the targeted beneficiaries fell. Frequent and excessive power outages may explain the incidence of idle labor and loss of opportunity cost in terms of capital and equipment, as a result of which the project failed to meet its main objectives.

Second most respondents (63 percent) felt that the project had had only a medium impact on business growth; 17 and 10 percent reported little or no impact, respectively. More than half were not satisfied with the loan amount, the fine on late payment, laborious documentation procedures, and loan processing time. This again shows that the project did not meet its objectives.

Third the proportion of beneficiaries' children attending a government school increased significantly while that of children enrolled in a private school was reduced. This was probably because households found it difficult to bear the costs of private schools (perhaps due to falls in income, increased private school fees, or combination of both).

Fourth the project led to an increased usage and ownership of semi-automatic electricity-driven equipment. Though one objective of the project was to increase productivity and the adoption of automatic machines could have potentially led to this, it seems that the beneficiaries were affected adversely by power outages, which affected their production

and annual income. Also, most project beneficiaries were small entrepreneurs who had owned a bicycle prior to receiving the loan. The survey revealed that bicycle ownership decreased while motorcycle ownership increased during the project period – this was seen as a positive impact. Most beneficiaries reported purchasing motorcycles to make their manufacturing operations more efficient.

Also, the percentage of unpaid labor (apprentices) fell and that of manufacturing units employing one to four paid artisans (in the treatment group) increased. The latter impact was likely driven by market and social demand. At the same time self-ownership of furniture workshop premises improved after the intervention. Also, ownership of personal transportation and basic household appliances remained constant before and after the intervention.

Overall, the government's project was unsuccessful: The average income among furniture units fell though this may be due to overall negative business factors such as power outages, especially during summer, which is peak business season. Also another weakness in the project was the fact that uniform loans were provided irrespective of the manufacturer's scale of business.

Our results imply that such microfinance schemes are feasible if designed with softer terms and conditions, and if beneficiaries concerns are better addressed.

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