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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
Publisher: Lahore School of Economics, Lahore, Pakistan.

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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Private School Participation in Pakistan

Quynh T. Nguyen* and Dhushyanth Raju**

Abstract

This study uses multiple rounds of national household sample surveys to examine the extent and nature of private school participation at the primary and secondary levels in Pakistan. Today, one fifth of children in Pakistan—or one third of all students—attend private school. Private school students tend to come from urban, wealthier, and better-educated households than government school students and especially out-of-school children. The characteristics of private school students relative to their government school peers and the former's composition differ in important ways across Pakistan's four provinces. Private school participation among children varies largely from one household to another rather than within households, and to a greater extent than government school participation. Private schooling is spatially concentrated, with a few districts (situated mainly in northern Punjab) accounting for most private school students. The spatial distributions of private school supply and participation are strongly correlated. In the 2000s, private school participation rates grew in Punjab, Sindh, and Khyber Pakhtunkhwa and across socioeconomic subgroups, contributing in particular to the growth in overall school participation rates for boys, urban children, and rich children. Nevertheless, the composition of private school students has become more equitable, driven mainly by Punjab, where the shares of private school students from rural and nonrich households have risen.

Keywords: Private schools, private school participation, Pakistan, household surveys.

JEL classification: I21, I25.

1. Introduction

The private school system in Pakistan has received growing and widespread attention in recent years both in academic and policy circles. Beginning in the 1990s, there has been a boom in private schools.[1] Using

* Global Education Practice, World Bank, Washington, D.C.
** Office of the Chief Economist, South Asia Region, World Bank, Washington, D.C.

[1] The boom in private schools and private school participation is likely driven by multiple factors. Andrabi, Das, and Khwaja (2013) find that the past expansion of government secondary schools for girls is one driver of the expansion of low-cost private schools. They argue that the pathway is secondary school-educated women taking up employment as teachers in low-cost private schools at low, market-competitive wage rates.

school census data from 1999/2000, Andrabi, Das, and Khwaja (2008) find that the majority of Pakistan's 36,000 private schools were established in the 1990s at the primary level. Using school census data from 2007/08, the Institute of Social and Policy Sciences (2010) reports that the number of private schools has since doubled to 70,000, with particularly strong growth in schools at the middle and high levels in both rural and urban areas. Using multiple rounds of household sample survey data, Andrabi et al. (2008) also find that private schools' share of enrollment rose markedly during the 1990s for both rich and poor households and for urban and rural households, with a larger increase in the provinces of Punjab and Khyber Pakhtunkhwa (KP) than in Sindh and Balochistan.[2]

Today, the private school system is composed largely of institutions that are for-profit, fee-based, secular, autonomous, unregulated in practice, and which lack direct government support. A large segment of the private school system is also highly affordable. School fees are generally low enough that poor households are able to pay them. For example, Andrabi et al. (2008) find that average tuition fees constitute 2 percent of average household income.[3]

In this study, we use recent rounds of household sample survey data that are national in coverage and representative at a low-administrative level—the district level—to provide a panoramic, high-resolution profile of private school participation at the primary and secondary levels in Pakistan.[4] Specifically, we examine patterns across (i) selected socioeconomic subpopulations, (ii) administrative divisions or spatial units (country, province, and district), and (iii) children within households.[5]

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[2] Over this same period, the government school system—the dominant provider of schooling in terms of the number of institutions and share of enrollment—has seen its position erode steadily, particularly in urban areas and in rural Punjab and KP. This has occurred despite the fact that government schools are ostensibly free for the user, while private schools typically charge fees.

[3] Private schools are affordable due to their low operating costs, a main component of which is labor. Private schools tend to be staffed by young, unmarried women with low levels of education and little or no formal training in teaching. Private school teachers are also paid substantially less on average than government school teachers, even after accounting for differences in the characteristics of teachers between the two school types (Andrabi et al., 2008).

[4] Pakistan has five administrative tiers: federal, province, district, *tehsil*/*taluka*, and union council. In 2010/11, the year of our most recent survey data, there were 113 districts in the four provinces.

[5] The study is descriptive: we do not examine what factors encourage or inhibit private school participation or which benefits—human capital and other—might accrue to children, families, and communities from private school participation. Existing research finds that private schooling is associated with higher student academic achievement (Alderman, Orazem, & Paterno, 2001; Das, Pandey, & Zajonc, 2006; Aslam, 2003, 2009; Andrabi, Bau, Das, & Khwaja, 2010; Andrabi, Das, Khwaja, & Zajonc, 2011) and labor market earnings (Asadullah, 2009) in Pakistan.

Our study builds on Andrabi et al. (2008) in that we update their findings from the 1990s by using household survey data to examine private school participation in the 2000s. Our study also extends previous work by extracting more information from the survey data available. For example, we determine whether and to what extent private school participation differs spatially (as measured at the district level) as well as among children across and within households. At the same time, our study is more limited than the previous work in that we do not examine the private school participation decision at the local level (see Andrabi et al., 2008) nor the attributes of private schools (see Institute of Social and Policy Sciences, 2010).

Our examination of current private school participation using household survey data from 2010/11 yields six main findings:

- First, the extent of private school participation for children in the 6–10 and 11–15 age groups is large: one fifth of all school-going children in Pakistan go to private school, which translates into one third of all students, given the sizeable share of the country's children that do not go to school at all.
- Second, as expected, private school students tend to come from urban, wealthier, and better-educated households than government school students and especially out-of-school children.
- Third, in addition to differences in private school participation rates across provinces, there are, at times, qualitative differences in the characteristics of private school students compared to their government school peers from one province to another. The composition of private school students also differs across provinces, with the sharpest distinctions arising between Punjab and KP on one hand and Sindh and Balochistan on the other.
- Fourth, private schooling is spatially concentrated in Pakistan, with over 50 percent of private school students residing in 10 out of the country's 113 districts. These 10 districts tend to be more urban and wealthier, and most of them are situated in northern Punjab.
- Fifth, most of the variation in private school participation among children is due to the variation in private school participation among children across households rather than within households.
- Sixth, spatial distributions of private school participation across provinces, districts, and rural versus urban areas are highly correlated with the spatial distributions in private school supply.

Our examination of the evolution of private school participation over the 2000s, using household survey data from 1998/99 onward, provides three main findings. First, private school participation rates grew markedly in Punjab, KP, and Sindh, as well as in all selected socioeconomic subgroups. Second, growth in private school participation rates contributed more to the growth in overall school participation rates for boys, children from urban households, and children from households in the highest wealth quintile (rich households) than for other socioeconomic subgroups. Third, growth in private school participation was nevertheless equalizing in nature, particularly in Punjab, where the shares of private school students from nonrich and rural households rose.[6]

The remainder of the paper is organized as follows. Section 2 describes the data and key variables. Section 3 discusses private school participation rates at the country level as well as across provinces and selected socioeconomic subgroups. Section 4 examines the differences in socioeconomic characteristics between private school students and government school students and out-of-school children at the country and province levels, and differences in the composition of private school students across provinces. Section 5 looks at the distribution of private school students across districts. Section 6 focuses on the distribution of private school participation among children within the same household. Section 7 discusses how private school participation rates and the composition of private school students have evolved over the 2000s. Section 8 looks at the association between the spatial distributions of private schools and private school participation. Section 9 summarizes our main findings.

2. Data and Variables

The data for this study come from national household sample surveys administered by the Pakistan Bureau of Statistics. In constructing the current picture, we have used data from the 2010/11 Pakistan Social and Living Standards Measurement Survey (PSLMS), the latest available survey for which primary data were publicly released by the Pakistan Bureau of Statistics at the time of writing this paper. The 2010/11 PSLMS is representative at the district level and interviewed 75,979 households in 5,368 primary sampling units (PSUs).[7]

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[6] Although appearing to be contradictory, the two findings are mutually possible. The first finding pertains to the extent of private school participation in subgroup *x*, while the second finding pertains to the extent of subgroup *x* in private school participation, where subgroup *x* is a minority subgroup in the population.

[7] Rural PSUs are villages. Urban PSUs are blocks of cities or towns, where each block is composed of 200–250 households (PSLMS reports, Pakistan Bureau of Statistics).

In constructing the picture over the 2000s, we use data from the 1998/99 Pakistan Integrated Household Survey (PIHS) and the 2004/05 PSLMS as baseline data to estimate the change in private school participation over 1998/99–2010/11, a 12-year period, and over 2004/05–2010/11, a six-year period, respectively. The 1998/99 PIHS is representative at the province level and interviewed 14,820 households in 1,050 PSUs; the 2004/05 PSLMS is representative at the district level and covers 73,424 households in 5,164 PSUs.

All the surveys cover the four provinces and the Islamabad Capital Territory, which accounted for less than 1 percent of the country's population in 2012. Given its relatively small size, we exclude Islamabad from our analysis and examine private school participation only in the four provinces. We refer to the four provinces taken together as the country.

The household surveys ask about the current schooling status of all individuals aged 4 or above. For those enrolled, the surveys ask about their current grade and school type. The response options for school type include government, private, and others (masjid school, *deeni madrassa*, NGO/trust school, and nonformal basic education community school). Given these response options, the choice of "private" roughly reflects for-profit, fee-based, secular private schools. In the 2010/11 survey, only 1.5 percent and 0.4 percent of children in the 4–18 age group were reported to be in masjid schools/deeni madrassas and in NGO/trust/community schools, respectively.

For the results reported in Section 3, children are defined as students if they are reported to be in grade 1 or above. Students are categorized into three school types: (i) private, (ii) government, and (iii) other. Out-of-school children are categorized as (i) those never in school, based on their response that they have never attended school or that the highest grade attended was *kachhi* (preschool), or (ii) those who dropped out, based on their response that they are currently not in school and the highest grade they attended was grade 1 or above.[8] For the results reported in Section 4 and after, children are defined as students only if they are reported to be in grade 1 or above in either private or government school, and students are categorized into these two types of schools alone.

[8] For those who dropped out of school, the surveys do not ask what type of school the individual last attended.

We examine private school participation for children in the 6–10 and 11–15 age groups, which correspond to the official ages for primary schooling (grades 1–5) and secondary schooling (grades 6–10), respectively (Pakistan, Ministry of Education, 2009). The private school participation rate for a given age group is defined as the share of children in that age group that is in private school. The private school share of enrollment for a given age group is defined as the share of students in that age group that is in private school. The characteristics of children we examine comprise (i) gender, (ii) age, (iii) household location (in terms of urban versus rural) and district, (iv) household wealth measured by household asset index quintiles, (v) completed education level of the household head, (vi) total household size, and (vii) the number of school-age children in the household (see Table A1 for details). All statistics are estimated accounting for survey sampling weights and, where relevant, clustering at the PSU level.

3. Extent of Private School Participation

The extent of private school participation in Pakistan has to be referenced against the extent of school participation in general. A large proportion of children simply do not go to school. The level of school participation in Pakistan is low relative to other South Asian countries, but also compared to other countries at Pakistan's per-capita income level.

3.1. Distribution of Children Across Schooling Statuses at the Country Level

Figure 1 depicts the distribution of children in the 6–10 and 11–15 age groups in 2010/11 across five schooling statuses for the country as a whole. The schooling statuses are (i) in private school, (ii) in government school, (iii) in other types of schools, (iv) never went to school, and (v) dropped out of school. At the country level, one third of children in the 6–10 age group are not in school. Specifically, 31 percent have never gone to school, while a negligible percentage has dropped out. Forty-five percent are in government school and 22 percent in private school. Given the sizeable share that is not in school, the private school participation rate of 22 percent translates into a private school share of enrollment of 32 percent.

The picture is similar for the 11–15 age group. One third is not in school. Specifically, 12 percent have dropped out, whereas 22 percent have never gone to school. Forty-six percent are in government school. Eighteen percent are in private school; this is a few percentage points lower than the

corresponding rate for the 6–10 age group. Again, given the sizeable share that is not in school, the private school participation rate of 18 percent translates into a private school share of enrollment of 27 percent.

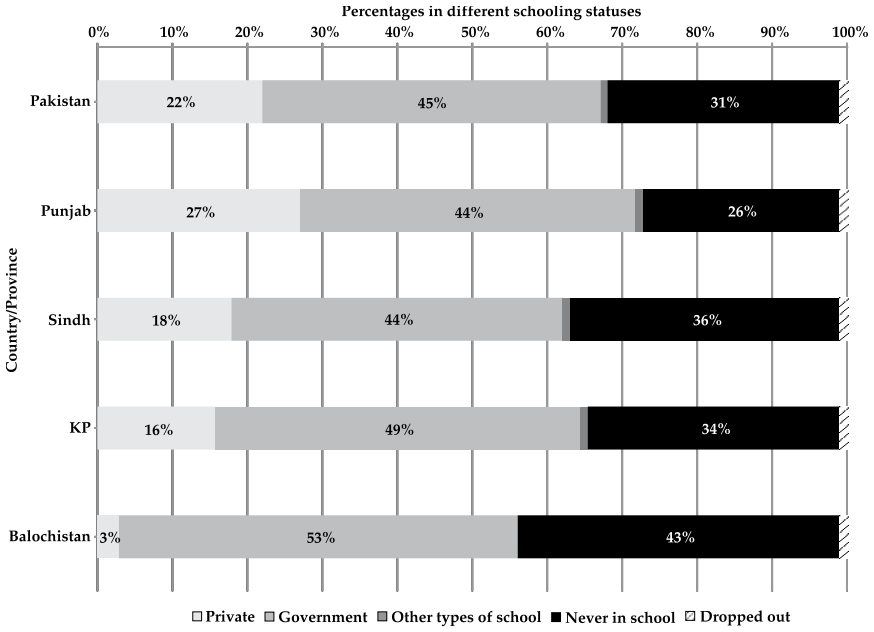
3.2. Private School Participation Rates Across Provinces

Figure 1 also depicts the distribution of children in 2010/11 across the five schooling statuses by province. For the 6–10 age group, Punjab has the highest private school participation rate at 27 percent, followed in descending order by Sindh (18 percent), KP (16 percent), and Balochistan (3 percent), which trails far behind. Government school participation rates differ to a lesser extent across provinces, between 44 percent and 53 percent. Lower private school participation rates in Sindh, KP, and Balochistan relative to Punjab are accompanied by higher out-of-school rates in these provinces. Given this, the relative differences in the private school share of enrollment between these provinces (especially Sindh and KP) and Punjab are smaller.

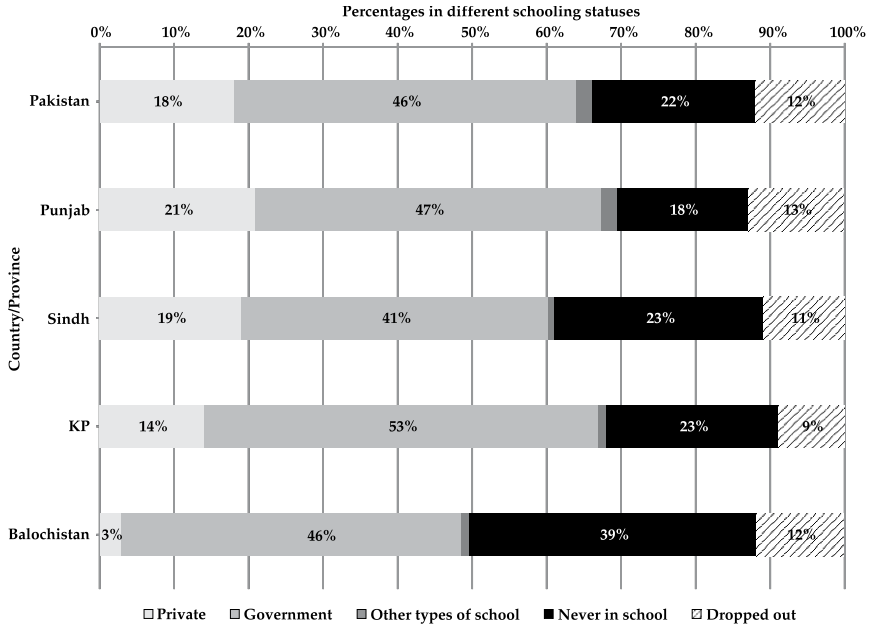
The patterns across provinces are similar for the 11–15 age group. Province rankings in terms of private school participation rates are the same and the relative differences across provinces in private school shares of enrollment are smaller than the relative differences between provinces in private school participation rates. While the private school participation rate is lower for the 11–15 age group relative to the 6–10 age group in Punjab (21 percent versus 27 percent), the rates across the two age groups are roughly equivalent in each of the other provinces.

Figure 1: Distribution of children by schooling status and province, 2010/11

Panel A: 6–10 age group



Panel B: 11–15 age group



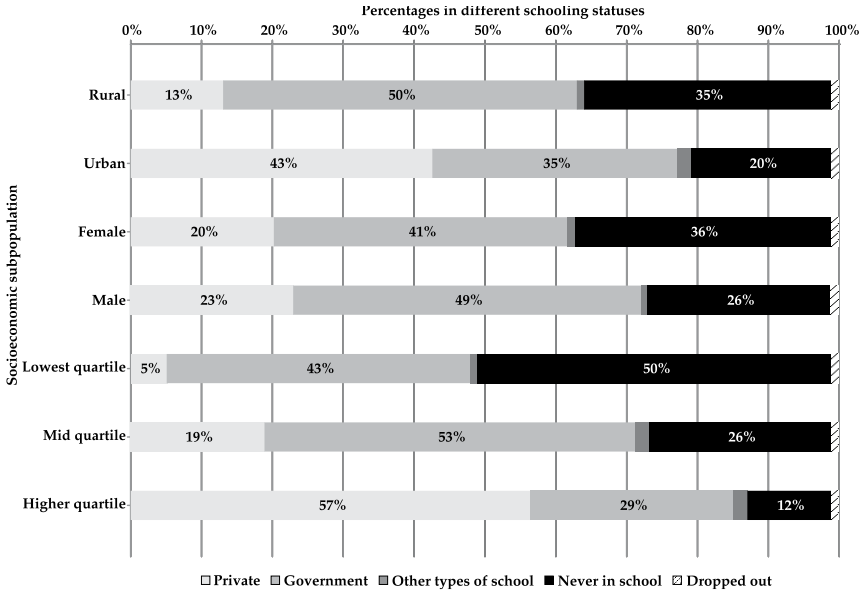
3.3. Private School Participation Rates Across Socioeconomic Subgroups

Figure 2 depicts the distribution of children in the 6–10 and 11–15 age groups in 2010/11 across the five schooling statuses by (i) location (urban versus rural), (ii) gender, and (iii) household wealth (lowest, middle, and highest quintiles). Private school participation rates are substantially lower in rural areas than in urban areas. For example, for the 6–10 age group, it is 13 percent in rural areas versus 43 percent in urban areas. In contrast, government school participation rates exhibit the opposite pattern. The rate is markedly higher in rural than urban areas for the 6–10 age group (50 percent versus 35 percent) and marginally higher for the 11–15 age group (48 percent versus 44 percent).

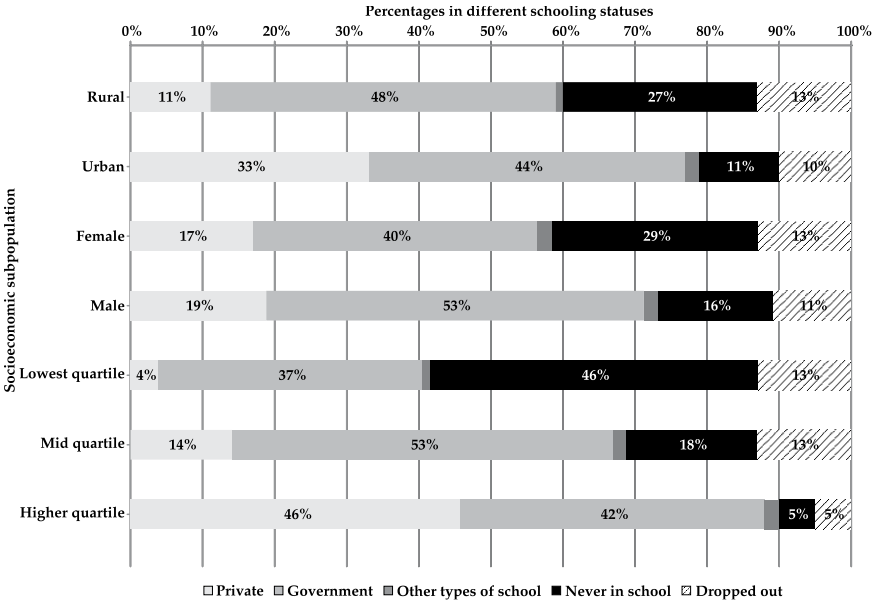
For both age groups, private school participation rates are slightly lower (by 2 to 3 percentage points) for girls relative to boys. The size of the female disadvantage in private school participation rates contrasts with the much larger female disadvantage in government school participation rates. For example, for the 6–10 age group, the female/male gap in government school participation rates is –8 percentage points. Disaggregating the data, the gender gap in private school participation rates remains just as small when we separately examine urban and rural children and children from poor (lowest wealth quintile) and nonpoor households. In contrast, the gender gap in government school participation rates is due largely to the corresponding gender gaps among rural and poor children.

Figure 2: Distribution of children by schooling status and socioeconomic subgroup, 2010/11

Panel A: 6–10 age group



Panel B: 11–15 age group



For both age groups, private school participation rates increase with household wealth quintiles. For example, for the 6–10 age group, the private school participation rate is 4 percent in the lowest wealth quintile, 20 percent in the middle quintile, and 57 percent in the highest quintile. In contrast, for both age groups, government school participation rates exhibit an inverted-U shape in relation to household wealth, peaking for the middle quintile. In the lowest quintile, the out-of-school rate markedly exceeds the government school participation rate. In the highest quintile, the private school participation rate markedly exceeds the government school participation rate for the 6–10 age group and marginally exceeds it for the 11–15 age group. These patterns are consistent with the likelihood of school participation increasing with household income and households with higher incomes purchasing higher-quality schooling, which tends to be supplied by the private market (Andrabi et al., 2008).

4. Characteristics of Private School Students and Correlates of Private School Participation

This section examines the socioeconomic characteristics of private school students relative to their government school and out-of-school peers and the differences in the composition of private school students.

4.1. Differences Between Private School Students and Other Groups at the Country Level

Table A2 reports the estimated means and proportions for selected child and household characteristics for private school students, and the differences in these values from those of government school students and out-of-school children, for the 6–10 and 11–15 age groups in the country as a whole. Private school students are more likely than out-of-school children to be male and to come from urban, wealthier, and better-educated households. Private school students also come from, on average, smaller households and households with smaller numbers of children than do out-of-school children. These findings apply to both age groups.

The same patterns hold when we compare private school students to government school students. The one exception is gender: private school students are more likely to be female than government school students (+1 percentage point for the 6–10 age group and +5 percentage points for the 11–15 age group). The differences between private school students and government school students are generally smaller compared to those between private school students and out-of-school children. These findings apply to both age groups.

Given that the likelihood of joining school increases with age over the primary school age bracket, the average age of private school students is higher than that of out-of-school children for the 6–10 age group. Conversely, given that the likelihood of dropping out of school increases with age over the secondary school age bracket, the mean age of private school students is lower than that of out-of-school children for the 11–15 age group. The mean age of private school students is lower than that of government school students for both age groups.

4.2. Differences Between Private School Students and Other Groups Across Provinces

We also compare the characteristics of private school students to those of government school students and out-of-school children, by province (for results, see Nguyen & Raju, 2014). While the pattern of differences between private school students and out-of-school children at the country level is reflected in each of the provinces, the same does not hold true for the pattern of differences between private school students and government school students. The country-level findings that the mean age of private school students is lower than that of government school students and that private school students are more likely to be female than government school students are only consistent in Punjab and Sindh, respectively. The country-level finding that, on average, private school students come from smaller households than do government school students is only consistent in Punjab and Sindh.[9]

4.3. Differences in the Composition of Private School Students Across Provinces

Tables A3 and A4 present the estimated means and proportions of selected characteristics of private school students in the 6–10 and 11–15 age groups, respectively, in each of the four provinces, and compare the differences in these values between private school students in each of the provinces. Private school students are more likely to be female in Punjab and Sindh than in Balochistan and KP, and much more likely to come from rural households in Punjab and KP than in Sindh and Balochistan.

[9] We also fit multinomial probit regression models to the data to examine the child and household correlates of the conditional likelihood of (i) being a government school student or (ii) being an out-of-school child relative to the base status of (iii) being a private school student. The regressions are run separately by age group for the country as a whole as well as for each of the provinces. We find several cases of weakening or absence of statistical significance in the conditional associations relative to the unconditional differences. This may be partly due to multicollinearity. These results are available from the authors on request.

Sindh is a particularly extreme case: only 10 percent or less of private school students in the 6–10 and 11–15 age groups come from rural households. Private school students in Punjab are more likely to come from less wealthy households than in each of the other provinces. Balochistan is considerably more top-heavy than the other provinces: close to 90 percent of private school students in the 6–10 and 11–15 age groups in the province come from households in the highest wealth quintile. Private school students in Punjab and KP are more likely to come from less-educated households than in Sindh and Balochistan. On one end, private school students in Sindh come from smaller households than in each of the other provinces; on the other end, private school students in KP come from larger households than in each of the other provinces.

Many of the findings on the pattern of inter-province differences in the composition of private school students apply to government school students as well. The inter-province differences in the composition of private school students are, however, much larger than those in the composition of government school students with respect to certain characteristics such as household location (urban versus rural), household wealth, and the household head's education level.

5. Distribution of Private School Students Across Districts

Next, we explore the spatial distribution of private school participation by measuring the distribution of private school students across districts, which is the lowest level of representativeness of our survey data. We find that private school participation is concentrated in Pakistan: ten districts (out of the 113 districts that comprise the four provinces) account for over 50 percent of private school students in the 6–10 and 11–15 age groups.

Table A5 reports summary statistics on the socioeconomic characteristics of these "top-ten" districts (referred to as the top-ten group), and compares them to the remaining districts as a whole (referred to as the nontop-ten group). For both age groups, private school participation is overrepresented in the top-ten group: the group's collective share of the total private school student population is double its collective share of the total child population in the country. Consequently, private school participation rates are higher in the top-ten group relative to the nontop-ten group for both age groups. In contrast, government school participation rates are lower in the top-ten group relative to the nontop-ten group for both age groups. The top-ten group is, on average, wealthier and has a higher urbanization share than the nontop-ten group.

While it may not necessarily be the case, differences in the socioeconomic characteristics of districts between the top-ten and nontop-ten groups are accompanied by similar differences in the socioeconomic characteristics of private school students between these two groups. Table A6 reports estimated means and proportions for selected characteristics of private school students in the top-ten group, and the differences in these means and proportions from those of private school students in the nontop-ten group, for the 6–10 and 11–15 age groups. For both age groups, private school students in the top-ten group (i) are more likely to be female and come from urban, wealthier, and better-educated households and (ii) come from smaller households than their counterparts in the nontop-ten group. For both age groups, the mean age of private school students is similar between the two district groups.

The districts in the top-ten group are themselves spatially concentrated. Apart from Karachi and Peshawar (which are in Sindh and KP, respectively), the remaining districts in the top-ten group are in Punjab. With the exception of Multan, the districts in the top-ten group in Punjab are largely clustered in the northeastern part of the province. Figures A1 and A2 in the Appendix depict the districts in Pakistan divided into three groups for private school students in the 6–10 and 11–15 age groups, respectively: (i) top-ten districts, (ii) nontop-ten districts where the district shares of private school students are equal to or greater than 1 percent, and (iii) nontop-ten districts where the district shares of private school students are less than 1 percent. The first two groups are largely composed of districts from Punjab, while the third group is largely composed of districts from the other three provinces.

6. Distribution of Private School Participation Among Children Within Households

Thus far, we have examined the extent of private school participation in all households with children in our age groups of interest, abstracting a child's own private school participation status from that of other children in her household. In the analysis below, we restrict our attention to households with multiple children in the age groups of interest and examine the extent of private school participation among children within households.[10]

[10] We do not strictly examine the distribution of private school participation among siblings because the PSLMS only provides information on the relation of household members to the household head. Thus, we cannot ascertain the sibling relations of children in the household that are not children of the household head.

6.1. Decomposition 1: Between- and Within-Household Breakdown of the Variation in Private School Participation Among Children

Table A7 presents standard analysis-of-variance estimates of the extent to which differences in school participation among children are due to differences among children across households (between-household variation) or differences among children within households (within-household variation), by school type (private versus government) and by province, for the 6–10 and 11–15 age groups. Estimations are performed on samples of households with at least two children in the relevant age group and at least one child in school. For decomposing the variation in private school participation among children, the outcome variable is set equal to 1 if a child goes to private school, and 0 otherwise. Likewise, for decomposing the variation in government school participation among children, the outcome variable is set equal to 1 if a child goes to government school, and 0 otherwise.

Private school participation largely varies from one household to another rather than within households. At the country level, 82 percent and 79 percent of the variation in private school participation among children in the 6–10 and 11–15 age groups, respectively, is due to between-household variation. That is, most parents choose to send all or none of their children to private school instead of sending some of their children to private school. In comparison, at the country level, relatively lower shares of the variation in government school participation among children—specifically, 66 percent for the 6–10 age group and 60 percent for the 11–15 age groups—are due to between-household variation. That is, the percentage of parents that send all or none of their children to private school exceeds the percentage of parents that do the same with respect to government schooling.

These findings hold across provinces. The difference in the percentage due to between-household variation between private school participation and government school participation is smallest in Punjab (11 percentage points for the 6–10 age group and 15 percentage points for the 11–15 age group) and largest in Balochistan (44 percentage points for the 6–10 age group and 40 percentage points for the 11–15 age group).

6.2. *Decomposition 2: Breakdown of Households by the Extent of Private School Participation Among Children Within Households*

We also examine the distribution of households with respect to the extent of private school participation among in-school children. Table A8 presents the estimated shares from disaggregating households with multiple children and at least one child in school into three mutually exclusive groups based on the extent of private school participation among children that are in school, for the 6–10 and 11–15 age groups and by province. The three groups are described as: (i) all in-school children in the relevant age group go to private school, (ii) some in-school children in the relevant age group go to private school (while the other children go to government school), and (iii) none of the in-school children in the relevant age group go to private school (all the in-school children go to government school). The three groups are denoted by type A (A for all), type S (S for some), and type N (N for none).

This alternative decomposition essentially reproduces the earlier finding that private school participation varies mainly among households. When households with multiple children send at least one child to school, they tend to send more than one child to school. For the 6–10 age group, 25 percent, 5 percent, and 70 percent of households are type-A, type-S, and type-N, respectively. The same pattern of the relative shares of household types holds for the 11–15 age group and in each of the provinces. The distribution of households by type varies across provinces, particularly between Punjab and Balochistan. For example, for the 6–10 age group, 31 percent and 7 percent of households are type-A and type-S in Punjab, respectively; the corresponding statistics for Balochistan are 4 percent and 1 percent, respectively.

6.3. *Differences Among Households in Types A, S, and N*

Table A9 reports estimated means and proportions for selected household-level characteristics for the three types of households in Pakistan, for the 6–10 and 11–15 age groups. In moving from type-A to type-S to type-N, the likelihood that the household is rural, poorer, and less educated increases. These patterns apply to both age groups. The country-level findings are also generally reflected in each of the provinces.[11] The pattern noted above is broadly consistent with the pattern of change in the socioeconomic characteristics of children when

[11] Statistics available from the authors on request.

we shift from private school students to government school students as discussed in Section 4. This similarity underscores the predominant role of household-level differences in driving child-level differences across schooling statuses.

6.4. Correlates of Private School Participation Within Households

Table A10 reports parameter estimates for age and gender—the only two child-level characteristics for which we have data—by estimating private school participation regressions via ordinary least squares, first accounting for differences in household characteristics and second with household-fixed effects. We run regressions separately for the 6–10 and 11–15 age groups, both for the country as a whole and by province. The outcome variable is set equal to 1 if the child goes to private school, and 0 otherwise. Note that, under this definition, 0 denotes both government school participation and out-of-school statuses.

At the country level, accounting for differences in household-level covariates, girls in both age groups are less likely to go to private school and older children in the 6–10 (11–15) age group are more (less) likely to go to private school. The same patterns remain when we identify these associations by looking among children within their households alone.[12] The country-level finding related to the conditional female disadvantage in private school participation is reflected in Balochistan, KP, and Punjab. The conditional female disadvantage in private school participation is largest in KP.[13]

Depending on the age group and province, the percent of total variation in private school participation explained by the regressions increases from 10 to 37 percent when we include household-level covariates, and from 55 to 80 percent when we include household-fixed effects. This indicates that a substantial portion of the variation in private school participation is explained by factors that vary at the household level or higher.

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[12] This finding updates and confirms Aslam's (2009) finding of a female disadvantage in private school participation within households using national household sample survey data from 2001/02.

[13] We also ran regressions with household-fixed effects where the outcome variable was set equal to 1 if the child goes to private school and to 0 if the child goes to government school, and found a similar pattern of a conditional female disadvantage in private school participation in Balochistan, KP, and Punjab. The conditional female disadvantage was particularly large for both age groups in KP and for the 11–15 age group in Balochistan.

7. Evolution of Private School Participation Rates During the 2000s

Table A11 presents the changes in overall school participation rates and private school participation rates (both in percentage point terms) as well as the contribution of the change in private school participation rates to the change in overall school participation rates (constructed as a ratio and expressed in percent terms) over the 12-year period from 1998/99 to 2010/11. The statistics are estimated for the country, by province, and by socioeconomic subgroup, for the 6–10 and 11–15 age groups. Note two measurement-related points. First, we refer to the absolute percentage point change in rates as "growth." Second, the growth is in net terms as there are flows both into and out of (private) school participation status at any given point in time.

7.1. Growth in Private School Participation Rates

At the country level, overall school participation rates grew by 17 percentage points and 14 percentage points for the 6–10 and 11–15 age groups, respectively. Over the same period, private school participation rates grew by 9 percentage points for both age groups. In KP, Punjab, and Sindh, overall and private school participation rates grew noticeably. In Balochistan, while the overall school participation rate for the 6–10 age group grew markedly (12 percentage points), the corresponding rate for the 11–15 age group grew relatively less (4 percentage points). Private school participation rates in Balochistan were virtually stagnant (1 percentage point) for both age groups.

At the country level, depending on the age group, growth in private school participation rates contributed equally or more than growth in government school participation rates to the growth in overall school participation rates over the period. At the province level, growth in private school participation rates accounts for most of the growth in overall school participation rates in Punjab for both age groups, in Sindh for the 11–15 age group, and in KP for the 6–10 age group. In Balochistan, Punjab, and Sindh, the contribution of growth in the private school participation rate to growth in the overall school participation rate is higher for the 11–15 age group than for the 6–10 age group.

Except for households in the highest wealth quintile (rich households) for whom overall school participation rates were relatively high to begin with, overall school participation rates grew by 10 to 20 percentage points for all subgroups, with higher growth for rural relative

to urban households, girls relative to boys, and households in the middle wealth quintile relative to those in the lowest and highest wealth quintiles.

All socioeconomic subgroups saw a significant increase in private school participation rates. However, in contrast to the finding for overall school participation rates, private school participation rates grew more for boys, urban households, and rich households. In the case of urban and rich households, depending on the age group, the growth in private school participation rates accounts for almost all or more than the growth in school participation rates. Finally, the contribution of growth in the private school participation rate to growth in the overall school participation rate is roughly the same or larger across socioeconomic subgroups for the 11–15 age group relative to the 6–10 age group.

7.2. Change in the Composition of Private School Students

Table A12 reports the estimated means and proportions of selected characteristics of private school students as well as the changes in means and proportions over the 12-year period from 1998/99 to 2010/11 and for the last half of the period, from 2004/05 to 2010/11, for the 6–10 and 11–15 age groups.

For both age groups, the share of private school students from rural households rose, while the share from rich households fell. Although we found earlier that the private school participation rates grew more for urban than for rural households and more for rich than for nonrich households, urban and rich households represent a minority of the total household population. As a result, the growth in private school participation rates among rural and nonrich households was sufficient to lead to a more equitable composition of private school students.

The share of private school students from households with the lowest level of education fell, while that from households with the highest level of education rose; both changes occurred in the latter part of the 2000s. These findings are due partly to the increasing education level of households in general over the period, with changes concentrated at the low and high ends of the education attainment range. In addition, we find that the average number of members and number of children in the households to which private school students belong has declined. This is due partly to declining household fertility rates in Pakistan in general. We do not find a change in the female share of private school students. All findings hold for both age groups.

The patterns of change at the country level are mainly reflected in Punjab (for results, see Nguyen & Raju, 2014). They are not consistently observed in the other provinces, where changes are at times either smaller or not statistically significant. Contrary to the finding at the country level of no change in the female share of private school students, for the 11–15 age group the corresponding share rose in Sindh but fell in Balochistan (during 2004/05–2010/11).

8. Role of Private School Supply

The private (government) participation rate reflects the equilibrium point between the levels of private (government) schooling demanded and supplied. Using data from the 2005 National Education Census (NEC), we examine whether patterns in the spatial variation in school supply by school type are related to patterns in the spatial variation of school participation rates by school type.[14]

Both market and policy factors potentially explain the spatial distributions of private and government schools. For example, the Pakistan government has had a longstanding policy of expanding school availability by constructing government schools across registered communities that meet the minimum population level requirement and where land is donated by the community. The government also assigns centrally recruited teachers through a system of transfers and postings. In contrast, where private schools choose to locate is largely dictated by market forces, which biases location decisions toward urban areas and more developed rural communities (Andrabi et al., 2008). De jure private school regulations do not explicitly constrain where private schools can locate, although specific stipulations in the regulations related to, for example, infrastructure, space, amenities, and tuition fees may influence where private schools choose to locate.

We documented earlier that (i) private school participation rates and the shares of households with all or some in-school children in private school are highest for both age groups in Punjab, followed in decreasing order by Sindh, KP, and Balochistan; (ii) the private school participation rate is lower for the 11–15 age group than for the 6–10 age group in Punjab but not in the other provinces; and (iii) the private school

[14] While there is time incompatibility between school supply information and school participation information (2005 versus 2011), we check the sensitivity of our findings by comparing school supply patterns from the 2005 NEC data against school participation patterns from the 2004/05 PSLMS data, and find that they are qualitatively similar.

participation rate is much lower in rural than urban areas. In contrast, government school participation rates differ far less across provinces for both age groups, and (depending on the age group) the rates are higher or roughly equal between rural and urban areas.

We also found that the distribution of private school students was skewed across districts (and disproportionately so, relative to the distribution of children across districts). This begs the question of whether the spatial pattern of private school supply is associated with these spatial patterns in private school participation across provinces, districts, and rural versus urban areas.

8.1. Private School Supply Across Provinces

Punjab has the highest share of private schools with primary grades at 69 percent, followed in descending order by Sindh (18 percent), KP (12 percent), and Balochistan (2 percent). These shares roughly match the population shares across provinces. The distribution of private schools with secondary grades across provinces is similar to that of private schools with primary grades, although the number of private schools with secondary grades is about two thirds that of private schools with primary grades. Thus, the spatial distribution in private school supply across provinces, measured by the number of schools, is consistent with the spatial distribution of private school participation rates and the shares of households with private school students across provinces. In line with the pattern of more comparable government school participation rates across provinces for both age groups, the spatial distributions of government schools with primary and secondary grades are less skewed than the corresponding spatial distributions for private schools.

The ratio of private schools with secondary grades to private schools with primary grades by province is highest in Punjab and Sindh (7:10), followed in descending order by KP (3:5) and Balochistan (1:2). Given this pattern, we discount provincial differences in the size of this ratio as an important explanation for the lower private school participation rate for the 11–15 age group relative to the 6–10 age group in Punjab and the absence of such differences between the two age groups in the other three provinces.

8.2. Private School Supply Between Urban and Rural Areas

The urban–rural ratio of private schools with primary grades is 3:2, while the corresponding statistic for government schools is 1:9. One third of the country's population resides in urban areas. Thus, private schools are disproportionately concentrated in urban areas whereas government schools are disproportionately concentrated in rural areas.

8.3. Private School Supply Across Districts

We examine the bivariate association between district-level numbers of private schools with primary (secondary) grades and district-level private school participation rates for the 6–10 (11–15) age group. Private school sizes may differ systematically across districts. Given this, we also examine the bivariate association between district-level numbers of private school students in primary (secondary) grades captured in the 2005 NEC, which we use as a measure of school size-adjusted private school supply, and district-level private school participation rates for the 6–10 (11–15) age group. The associations are always positive, that is, there are more private schools or higher private school enrollment in districts with higher private school participation rates. We examine the same associations between government school supply and government school participation and find no discernible relationship across districts.

9. Summary

Using multiple rounds of national household sample survey data, we have examined the contemporaneous (2010/11) extent and nature of private school participation in Pakistan at the country, province, and district levels. We have also examined the extent and nature of the evolution of private school participation during the 2000s.

This provides six main findings. First, the extent of private school participation for children in the 6–10 and 11–15 age groups is significant: one fifth of children go to private school in Pakistan, which translates into one third of all students, given the large share of children that do not go to school at all. Second, as expected, private school students tend to come from urban, wealthier, and better-educated households than government school students and especially out-of-school children.

Third, aside from differences in private school participation rates across provinces, there are, at times, differences across provinces in the characteristics of private school students compared to their government

school peers. The composition of private school students also differs across provinces, with the sharpest distinctions between Punjab and KP on one side and Sindh and Balochistan on the other. Differences in the composition of private school students between KP and Sindh are particularly interesting, given that these two provinces have comparable private school participation rates.

Fourth, private schooling is highly concentrated in Pakistan, with over 50 percent of private school students residing in 10 out of 113 districts in the country. These 10 districts tend to be more urban and wealthier, and most are situated in northern Punjab. Fifth, most of the variation in school participation among children is due to variation in school participation among children across rather than within households. This pattern is much more pronounced with respect to private school participation than to government school participation. Sixth, spatial patterns in private school participation across provinces, districts, and rural versus urban areas frequently overlap to a high degree with spatial patterns in private school supply (obtained using separate school census data).

Our examination of the evolution of private school participation during the 2000s, using household survey data from 1998/99 onward, provides three main findings. First, private school participation rates grew markedly in Punjab, KP, and Sindh as well as across all selected socioeconomic subgroups. Second, the growth in private school participation rates contributed more to the growth in overall school participation rates for boys, children from urban households, and children from rich households than for children in other socioeconomic subgroups. Third, the growth in private school participation was nevertheless equalizing in nature, particularly in Punjab, where the shares of private school students from rural and nonrich households rose.

The collective evidence indicates the importance of the private school system in Pakistan, in terms of both its present extent and recent growth. Assuming that offering quality education to all is the ultimate aim, government efforts to improve public school system access and quality would likely be more efficient and effective if education reforms were sensitive to the extent and nature of private school supply at the local level. Additionally, any regulations of the private school system would likely be more effective if they protected consumers and staff of private schools, but also ensured fair and effective competition to promote private school entry, growth, and performance.

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Appendix

Table 1: Variable definitions and construction

Variable	Definition	Construction
Age	Child's age in completed years	As recorded in the survey.
Female	Child female dummy (0 = male, 1 = female)	As recorded in the survey.
Rural	Household rural dummy (0 = urban, 1 = rural)	As recorded in the survey.
Household asset index quintiles	Household wealth quintiles: • First (lowest) • Second • Third (mid) • Fourth • Fifth (highest)	Collapsing the dataset to the household level, a province-specific normalized household asset index was constructed via principal components analysis, using household sampling weights. The components included (i) whether the household owns the home, (ii) the number of rooms in the home, (iii) whether the main source of lighting is electricity, (iv) whether the main source of fuel for cooking is gas/electricity, (v) whether the main source of drinking water is piped water, (vi) whether the toilet facility is a flush type, (vii) whether the household has a fridge, a computer, a TV, an air conditioner, and a music player. Households were then split into asset index quintiles. The quintile for the household was assigned to all children in the 6–15 age group in that household.

Variable	Definition	Construction
Household head's highest education	Highest grade of education completed: • No schooling • Grades 1–5 (primary school) • Grades 6–8 (middle school) • Grades 9–10 (secondary school) • Grade 11 or above (higher secondary and above)	This was constructed using information on the highest grade ever completed if the household head was not currently in school. If the household head was currently in school, information on the current grade was used to assign the individual the preceding grade for this variable. Using this continuous variable, household heads were split into the five categories of highest education completed. The household head's category was assigned to all children in the 6–15 age group in that household.
Household size	Number of members in the household	The sum of all individuals on the household roster. The value was assigned to all children in the 6–15 age group in the household.
Number of children in the household in a given age group	Number of child members in the household in the given age group (6–10, 11–15)	The sum of children in the given age group on the household roster. The value was assigned to all children in the 6–15 age group in the household.

Table 2: Mean characteristics of private school students, 2010/11

	6–10 age group			11–15 age group		
	Private school students	Diff. from govt. school students	Diff. from out-of-school children	Private school students	Diff. from govt. school students	Diff. from out-of-school children
Characteristic	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Age (in complete years)	8.09	–0.12***	0.52***	12.83	–0.05***	–0.51***
	(1.37)	(0.02)	(0.02)	(1.37)	(0.02)	(0.02)
Female	0.45	0.01**	–0.11***	0.44	0.05***	–0.13***
	(0.50)	(0.01)	(0.01)	(0.50)	(0.01)	(0.01)
Rural	0.45	–0.34***	–0.37***	0.42	–0.28***	–0.38***
	(0.50)	(0.01)	(0.01)	(0.49)	(0.01)	(0.01)
Lowest (first) HH asset index quintile	0.06	–0.19***	–0.37***	0.04	–0.12***	–0.32***
	(0.24)	(0.01)	(0.01)	(0.20)	(0.01)	(0.01)
Mid (third) HH asset index quintile	0.17	–0.05***	0.01*	0.15	–0.08***	–0.04***
	(0.38)	(0.01)	(0.01)	(0.36)	(0.01)	(0.01)
Highest (fifth) HH asset index quintile	0.37	0.28***	0.32***	0.44	0.28***	0.39***
	(0.48)	(0.01)	(0.01)	(0.50)	(0.01)	(0.01)
HH head's highest ed.: no schooling	0.26	–0.19***	–0.39***	0.24	–0.16***	–0.42***
	(0.44)	(0.01)	(0.01)	(0.43)	(0.01)	(0.01)
HH head's highest ed.: grades 1–5	0.15	–0.05***	–0.01*	0.13	–0.05***	–0.03***
	(0.35)	(0.01)	(0.01)	(0.34)	(0.01)	(0.01)
HH head's highest ed.: grades 6–8	0.14	0.02***	0.06***	0.13	0.00	0.07***
	(0.35)	(0.01)	(0.00)	(0.34)	(0.01)	(0.01)
HH head's highest ed.: grades 9–10	0.23	0.09***	0.15***	0.23	0.07***	0.16***
	(0.42)	(0.01)	(0.01)	(0.42)	(0.01)	(0.01)

	6–10 age group			11–15 age group		
	Private school students	Diff. from govt. school students	Diff. from out-of-school children	Private school students	Diff. from govt. school students	Diff. from out-of-school children
Characteristic	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
HH head's highest ed.: grade 11+	0.23	0.13***	0.19***	0.26	0.14***	0.22***
	(0.42)	(0.01)	(0.01)	(0.44)	(0.01)	(0.01)
HH size	7.76	–0.32***	–0.43***	7.50	–0.51***	–0.68***
	(3.46)	(0.06)	(0.06)	(3.13)	(0.06)	(0.06)
Number of children aged 6–10 in HH	1.99	–0.19***	–0.29***	1.10	–0.20***	–0.34***
	(0.95)	(0.02)	(0.02)	(1.07)	(0.02)	(0.02)
Number of children aged 11–15 in HH	0.92	–0.22***	–0.16***	1.87	–0.09***	–0.11***
	(1.00)	(0.02)	(0.02)	(0.82)	(0.02)	(0.02)

Notes: HH = household.
Pakistan comprises the four provinces only. Standard deviations are reported in parentheses in columns (1) and (2). Standard errors are reported in parentheses in columns (2), (3), (5), and (6); these are estimated accounting for clustering at the PSU level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ (two-tailed significance tests).
Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 3: Mean characteristics of private school students (6–10 age group), by province, 2010/11

Characteristic	P (1)	S (2)	KP (3)	B (4)	P–S (5)	P–KP (6)	P–B (7)	S–KP (8)	S–B (9)	KP–B (10)
Age (in complete years)	8.08	8.11	8.14	8.10	–0.03	–0.07*	–0.02	–0.03	0.01	0.05
	(1.37)	(1.41)	(1.33)	(1.42)	(0.03)	(0.03)	(0.09)	(0.04)	(0.10)	(0.10)
Female	0.45	0.46	0.38	0.39	–0.01	0.07***	0.06*	0.08***	0.07**	–0.01
	(0.50)	(0.50)	(0.49)	(0.49)	(0.01)	(0.01)	(0.03)	(0.02)	(0.04)	(0.04)
Rural	0.52	0.10	0.66	0.15	0.43***	–0.14***	0.37***	–0.56***	–0.06	0.50***
	(0.50)	(0.29)	(0.47)	(0.36)	(0.02)	(0.03)	(0.04)	(0.03)	(0.04)	(0.05)
Lowest (first) HH asset index quintile	0.08	0.01	0.03	0.02	0.07***	0.05***	0.06***	–0.02**	0.00	0.01
	(0.27)	(0.12)	(0.17)	(0.13)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Mid (third) HH asset index quintile	0.19	0.13	0.15	0.01	0.05***	0.03**	0.18***	–0.02	0.13***	0.15***
	(0.39)	(0.34)	(0.36)	(0.08)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Highest (fifth) HH asset index quintile	0.31	0.50	0.47	0.87	–0.19***	–0.16***	–0.55***	0.03	–0.36***	–0.39***
	(0.46)	(0.50)	(0.50)	(0.34)	(0.02)	(0.02)	(0.03)	(0.03)	(0.04)	(0.04)
HH head's highest ed.: no schooling	0.28	0.15	0.34	0.18	0.13***	–0.07***	0.09***	–0.19***	–0.03	0.16***
	(0.45)	(0.35)	(0.47)	(0.39)	(0.01)	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)
HH head's highest ed.: grades 1–5	0.16	0.12	0.09	0.13	0.05***	0.07***	0.03	0.02*	–0.01	–0.04
	(0.37)	(0.32)	(0.29)	(0.34)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)
HH head's highest ed.: grades 6–8	0.16	0.10	0.11	0.09	0.05***	0.04***	0.06**	–0.01	0.01	0.02
	(0.36)	(0.30)	(0.32)	(0.29)	(0.01)	(0.01)	(0.03)	(0.01)	(0.03)	(0.03)
HH head's highest ed.: grades 9–10	0.24	0.20	0.22	0.15	0.03***	0.02	0.08**	–0.02	0.05	0.06*
	(0.42)	(0.40)	(0.41)	(0.36)	(0.01)	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)
HH head's highest ed.: grade 11+	0.17	0.43	0.24	0.44	–0.26***	–0.07***	–0.27***	0.19***	–0.01	–0.20***
	(0.38)	(0.50)	(0.43)	(0.50)	(0.02)	(0.02)	(0.05)	(0.02)	(0.05)	(0.05)
HH size	7.66	7.24	9.27	8.16	0.42***	–1.61***	–0.5	–2.03***	–0.92**	1.11***

Characteristic	P (1)	S (2)	KP (3)	B (4)	P–S (5)	P–KP (6)	P–B (7)	S–KP (8)	S–B (9)	KP–B (10)
	(3.23)	(3.14)	(4.74)	(3.73)	(0.13)	(0.21)	(0.37)	(0.23)	(0.38)	(0.41)
Children aged 6–10 years in HH	1.97	1.91	2.25	2.17	0.06	–0.28***	–0.20**	–0.34***	–0.26***	0.08
	(0.92)	(0.90)	(1.16)	(0.95)	(0.04)	(0.05)	(0.09)	(0.06)	(0.09)	(0.10)
Children aged 11–15 years in HH	0.90	0.88	1.14	0.98	0.02	–0.24***	–0.08	–0.26***	–0.10	0.16*
	(0.99)	(0.97)	(1.09)	(0.99)	(0.03)	(0.04)	(0.08)	(0.05)	(0.09)	(0.09)

Notes: HH = household, P = Punjab, S = Sindh, KP = Khyber Pakhtunkhwa, B = Balochistan.
Standard deviations are reported in parentheses in columns (1)–(4). Standard errors are reported in parentheses in columns (5)–(10); these are estimated accounting for clustering at the PSU level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ (two-tailed significance tests).
Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 4: Mean characteristics of private school students (11–15 age group), by province, 2010/11

Characteristic	P (1)	S (2)	KP (3)	B (4)	P–S (5)	P–KP (6)	P–B (7)	S–KP (8)	S–B (9)	KP–B (10)
Age (in complete years)	12.79	12.92	12.87	13.00	–0.13***	–0.08**	–0.21**	0.06	–0.08	–0.13
	(1.36)	(1.38)	(1.39)	(1.32)	(0.04)	(0.04)	(0.08)	(0.05)	(0.09)	(0.09)
Female	0.46	0.47	0.31	0.25	0.00	0.16***	0.21***	0.16***	0.21***	0.05
	(0.50)	(0.50)	(0.46)	(0.44)	(0.02)	(0.02)	(0.04)	(0.02)	(0.04)	(0.04)
Rural	0.52	0.05	0.64	0.21	0.47***	–0.12***	0.32***	–0.59***	–0.15***	0.43***
	(0.50)	(0.23)	(0.48)	(0.41)	(0.02)	(0.03)	(0.06)	(0.03)	(0.05)	(0.06)
Lowest (first) HH asset index quintile	0.06	0.01	0.03	0.01	0.05***	0.03***	0.05***	–0.02***	0.00	0.02**
	(0.23)	(0.08)	(0.17)	(0.10)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Mid (third) HH asset index quintile	0.18	0.10	0.14	0.03	0.08***	0.04**	0.14***	–0.04**	0.07***	0.11***
	(0.38)	(0.30)	(0.35)	(0.18)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Highest (fifth) HH asset index quintile	0.37	0.57	0.52	0.89	–0.20***	–0.15***	–0.53***	0.05	–0.33***	–0.38***
	(0.48)	(0.50)	(0.50)	(0.31)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)
HH head's highest ed.: no schooling	0.28	0.12	0.31	0.18	0.17***	–0.02	0.13**	–0.19***	–0.06	0.13***
	(0.45)	(0.32)	(0.46)	(0.38)	(0.01)	(0.02)	(0.04)	(0.02)	(0.04)	(0.04)
HH head's highest ed.: grades 1–5	0.16	0.09	0.09	0.06	0.07***	0.07***	0.10***	0.01	0.03	0.03
	(0.37)	(0.29)	(0.28)	(0.24)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)
HH head's highest ed.: grades 6–8	0.14	0.13	0.11	0.10	0.01	0.04***	0.04	0.03*	0.03	0.00
	(0.35)	(0.34)	(0.31)	(0.30)	(0.01)	(0.01)	(0.03)	(0.02)	(0.03)	(0.03)
HH head's highest ed.: grades 9–10	0.24	0.21	0.22	0.16	0.03*	0.02	0.08**	–0.01	0.05	0.06
	(0.43)	(0.41)	(0.41)	(0.36)	(0.02)	(0.02)	(0.04)	(0.02)	(0.04)	(0.04)
HH head's highest ed.: grade 11+	0.18	0.45	0.29	0.50	–0.27***	–0.11***	–0.33***	0.16***	–0.05	–0.22***
	(0.38)	(0.50)	(0.45)	(0.50)	(0.02)	(0.02)	(0.06)	(0.03)	(0.06)	(0.06)
HH size	7.48	6.98	8.63	7.86	0.51***	–1.14***	–0.38	–1.65***	–0.88***	0.76**

Characteristic	P (1)	S (2)	KP (3)	B (4)	P–S (5)	P–KP (6)	P–B (7)	S–KP (8)	S–B (9)	KP–B (10)
	(2.96)	(2.85)	(4.10)	(2.94)	(0.13)	(0.19)	(0.30)	(0.21)	(0.31)	(0.34)
Children aged 6–10 years in HH	1.10	0.95	1.34	1.29	0.15***	–0.23***	–0.19*	–0.38***	–0.34***	0.05
	(1.05)	(1.00)	(1.28)	(1.06)	(0.04)	(0.05)	(0.11)	(0.06)	(0.11)	(0.12)
Children aged 11–15 years in HH	1.88	1.80	1.97	1.94	0.09***	–0.08**	–0.06	–0.17***	–0.15**	0.02
	(0.82)	(0.77)	(0.89)	(0.75)	(0.03)	(0.04)	(0.07)	(0.04)	(0.07)	(0.07)

Notes: HH = household, P = Punjab, S = Sindh, KP = Khyber Pakhtunkhwa, B = Balochistan.
Standard deviations are reported in parentheses in columns (1)–(4). Standard errors are reported in parentheses in columns (5)–(10); these are estimated accounting for clustering at the PSU level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ (two-tailed significance tests).
Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 5: Characteristics of top-ten group vs. nontop-ten group

Indicator	Top-ten group	Nontop-ten group
Group share of private school students, 6–10 age group (%)	51	49
Group share of private school students, 11–15 age group (%)	57	43
Group share of total population, 6–10 age group (%)	25	75
Group share of total population, 11–15 age group (%)	29	71
Private school participation rate among 6–10 age group (%)	44	14
Private school participation rate among 11–15 age group (%)	36	11
Govt. school participation rate among 6–10 age group (%)	32	50
Govt. school participation rate among 11–15 age group (%)	41	49
Urban share of group (%)	62	21
Mean household asset index in group	0.72	–0.19

Notes: The top-ten group comprises Karachi, Lahore, Gujranwala, Faisalabad, Sialkot, Rawalpindi, Multan, Sheikhupura, Gujrat, and Peshawar. The nontop-ten group comprises the remaining 103 districts.
Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 6: Characteristics of private school students, by age group and top-ten group vs. nontop-ten group, 2010/11

	6–10 age group		11–15 age group	
	Top-ten group	Diff. from nontop-ten group	Top-ten group	Diff. from nontop-ten group
Characteristic	**(1)**	**(2)**	**(3)**	**(4)**
Age (in complete years)	8.11	0.04	12.85	0.03
	(1.38)	(0.02)	(1.37)	(0.03)
Female	0.47	0.04***	0.48	0.07***
	(0.50)	(0.01)	(0.50)	(0.01)
Rural	0.31	–0.28***	0.28	–0.33***
	(0.46)	(0.02)	(0.45)	(0.03)
Lowest (first) HH asset index quintile	0.02	–0.08***	0.02	–0.05***
	(0.15)	(0.01)	(0.13)	(0.01)
Mid (third) HH asset index quintile	0.13	–0.08***	0.12	–0.08***
	(0.34)	(0.01)	(0.33)	(0.01)
Highest (fifth) HH asset index quintile	0.46	0.18***	0.53	0.21***
	(0.50)	(0.02)	(0.50)	(0.02)
HH head's highest ed.: no schooling	0.23	–0.06***	0.21	–0.07***
	(0.42)	(0.01)	(0.41)	(0.01)
HH head's highest ed.: grades 1–5	0.13	–0.04***	0.12	–0.03***
	(0.33)	(0.01)	(0.33)	(0.01)
HH head's highest ed.: grades 6–8	0.15	0.01	0.14	0.02**
	(0.35)	(0.01)	(0.35)	(0.01)
HH head's highest ed.: grades 9–10	0.24	0.03***	0.24	0.03**
	(0.43)	(0.01)	(0.43)	(0.01)
HH head's highest ed.: grade 11+	0.26	0.05***	0.28	0.06***

	6–10 age group		11–15 age group	
	Top-ten group	Diff. from nontop-ten group	Top-ten group	Diff. from nontop-ten group
Characteristic	**(1)**	**(2)**	**(3)**	**(4)**
	(0.44)	(0.01)	(0.45)	(0.02)
HH size	7.45	–0.62***	7.19	–0.73***
	(3.29)	(0.11)	(2.98)	(0.11)
Children in the 6–10 age group in HH	1.93	–0.13***	0.99	–0.24***
	(0.93)	(0.03)	(1.01)	(0.04)
Children in the 11–15 age group in HH	0.88	–0.08***	1.84	–0.07**
	(0.99)	(0.03)	(0.81)	(0.03)

Notes: HH = household.
The top-ten group comprises Karachi, Lahore, Gujranwala, Faisalabad, Sialkot, Rawalpindi, Multan, Sheikhupura, Gujrat, and Peshawar. The nontop-ten group comprises the remaining 103 districts.
Standard deviations are presented in parentheses in columns (1) and (3). Standard errors are presented in parentheses in columns (2) and (4); these are estimated accounting for clustering at the PSU level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ (two-tailed significance tests).
Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 7: Decomposition of the variation in school participation, by school type, 2010/11

Households with multiple children and at least one child in school in each age group

	Percent of total variation in private school participation		Percent of total variation in government school participation	
	Between-household	Within-household	Between-household	Within-household
Province	(1)	(2)	(3)	(4)
Panel A: 6–10 age group				
Pakistan	82	18	66	34
Punjab	81	19	70	30
Sindh	86	14	66	34
KP	77	23	57	43
Balochistan	88	12	44	56
Panel B: 11–15 age group				
Pakistan	79	21	60	40
Punjab	75	25	60	40
Sindh	89	11	64	36
KP	79	21	55	45
Balochistan	83	17	43	57

Notes: Pakistan comprises the four provinces only. The sample for Panel A is households with multiple children in the 6–10 age group; the sample for Panel B is households with multiple children in the 11–15 age group. The estimated shares attributable to within-household variations in (private/government) school participation also include noise and are thus likely to be overestimates of the actual shares of within-household variations in (private/government) school participation. In each row, the estimated shares in columns (1) and (2) sum to 100%. In each row, the estimated shares in columns (3) and (4) sum to 100%.

Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 8: Distribution of households in terms of the extent of private schooling across in-school children within households, 2010/11

Households with multiple children and with at least one child in school

	Mean number of children in household	Mean percent of children in household in school	Percentage of households with in-school children in private school		
			Type A	Type S	Type N
Province	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
Panel A: 6–10 age group					
Pakistan	2.5	82	25	5	70
Punjab	2.4	83	31	7	62
Sindh	2.5	81	20	3	77
KP	2.7	77	20	5	75
Balochistan	2.4	79	4	1	95
Panel B: 11–15 age group					
Pakistan	2.3	82	18	10	72
Punjab	2.3	83	20	13	67
Sindh	2.3	81	20	5	75
KP	2.4	80	13	9	78
Balochistan	2.3	75	4	2	94

Notes: Type A = all children, type S = some children, type N = no children.
Pakistan comprises the four provinces only. The sample for Panel A is households with multiple children in the 6–10 age group and at least one of them in school; the sample for Panel B is households with multiple children in the 11–15 age group and at least one of them in school. In each row, the percentages in columns (3)–(5) sum to 100%.
Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 9: Mean characteristics of households in groups in terms of the extent of private schooling across in-school children within households, Pakistan, 2010/11

Households with multiple children and with at least one child in school

	In-school children, 6–10 age group			In-school children, 11–15 age group		
	Type A	Type S	Type N	Type A	Type S	Type N
Characteristic	(1)	(2)	(3)	(4)	(5)	(6)
Rural	0.46	0.66	0.81	0.43	0.61	0.73
	(0.50)	(0.47)	(0.40)	(0.49)	(0.49)	(0.44)
Lowest (first) HH asset index quintile	0.06	0.09	0.25	0.04	0.04	0.16
	(0.24)	(0.28)	(0.43)	(0.20)	(0.20)	(0.37)
Mid (third) HH asset index quintile	0.18	0.24	0.24	0.17	0.24	0.25
	(0.38)	(0.43)	(0.43)	(0.37)	(0.43)	(0.43)
Highest (fifth) HH asset index quintile	0.38	0.26	0.08	0.43	0.31	0.13
	(0.48)	(0.44)	(0.27)	(0.49)	(0.46)	(0.33)
HH head's highest ed.: no schooling	0.29	0.37	0.48	0.28	0.32	0.45
	(0.45)	(0.48)	(0.50)	(0.45)	(0.46)	(0.50)
HH head's highest ed.: grades 1–5	0.15	0.2	0.19	0.15	0.14	0.19
	(0.35)	(0.40)	(0.39)	(0.35)	(0.35)	(0.39)
HH head's highest ed.: grades 6–8	0.15	0.13	0.11	0.13	0.16	0.12
	(0.35)	(0.34)	(0.31)	(0.33)	(0.37)	(0.33)
HH head's highest ed.: grades 9–10	0.21	0.2	0.12	0.21	0.22	0.14
	(0.41)	(0.40)	(0.33)	(0.41)	(0.41)	(0.35)
HH head's highest ed.: grade 11+	0.21	0.11	0.09	0.23	0.16	0.10
	(0.41)	(0.31)	(0.29)	(0.42)	(0.37)	(0.29)
HH size	9.19	11.02	9.19	8.76	9.79	9.31

Characteristic	In-school children, 6–10 age group			In-school children, 11–15 age group		
	Type A (1)	Type S (2)	Type N (3)	Type A (4)	Type S (5)	Type N (6)
	(4.21)	(4.95)	(3.57)	(3.68)	(4.49)	(3.64)
Children aged 6–10 years in HH	2.41	2.82	2.51	1.30	1.47	1.55
	(0.76)	(1.01)	(0.81)	(1.17)	(1.35)	(1.23)
Children aged 11–15 years in HH	1.02	1.35	1.29	2.27	2.47	2.33
	(1.06)	(1.14)	(1.06)	(0.56)	(0.71)	(0.62)
Share of children in 6–10 (11–15) age group that are in school	0.84	0.94	0.80	0.87	0.97	0.78
	(0.23)	(0.14)	(0.25)	(0.22)	(0.09)	(0.25)

Notes: Type A = all children, type S = some children, type N = no children, HH = household.
Standard deviations are provided in parentheses.
Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 10: Parameter estimates from private school participation regressions, 2010/11

Households with multiple children and at least one child in school

	Pakistan		Punjab		Sindh		KP		Balochistan	
Variable	**(1)**	**(2)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Panel A: 6–10 age group										
Age (in complete years)	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.02***	0.03***	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Female	–0.02***	–0.02***	–0.03***	–0.02***	–0.01	–0.00	–0.05***	–0.05***	–0.01*	–0.01**
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Household-level covariates	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Household dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.20	0.70	0.17	0.67	0.37	0.77	0.20	0.63	0.14	0.80
Number of children	46,864	46,864	16,818	16,818	12,198	12,198	9,459	9,459	8,389	8,389
Panel B: 11–15 age group										
Age (in complete years)	–0.02***	–0.02***	–0.02***	–0.02***	–0.02***	–0.01***	–0.01***	–0.01**	–0.00	–0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Female	–0.01**	–0.03***	0.00	–0.02	–0.01	–0.01	–0.09***	–0.10***	–0.03***	–0.02***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Household-level covariates	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Household dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
R-squared	0.15	0.63	0.10	0.55	0.31	0.81	0.20	0.65	0.12	0.69
Number of children	33,246	33,246	13,476	13,476	7,695	7,695	7,290	7,290	4,785	4,785

Notes: Pakistan comprises the four provinces only. Standard errors are reported in parentheses; these are estimated accounting for clustering at the PSU level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ (two-tailed significance tests).

Household-level covariates comprise household location (urban/rural), wealth (in asset index quintiles), the household head's highest education, household size, and number of children in different age groups.

Source: Authors' estimates using the 2010/11 PSLMS. All statistics are estimated accounting for survey sampling weights.

Table 11: Evolution of overall and private school participation rates, by age group, 1998/99–2010/11

	6–10 age group			11–15 age group		
	Δ in school PR (ppt)	Δ in private school PR (ppt)	Private school share of Δ in school PR (%)	Δ in school PR (ppt)	Δ in private school PR (ppt)	Private school share of Δ in school PR (%)
Area/group	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Panel A: Country/province						
Pakistan	16.9	8.8	51.8	14.1	8.9	63.4
Punjab	18.4	11.2	61.1	15.3	10.3	67.2
Sindh	15.5	5.9	37.9	11.5	8.3	72.1
KP	16.6	8.5	51.0	17.0	7.8	45.9
Balochistan	12.2	0.8	6.8	4.4	0.8	17.2
Panel B: Socioeconomic subgroup						
Female	18.5	8.4	45.5	16.6	9.2	55.5
Male	15.1	9.0	59.9	11.0	8.6	77.7
Rural	18.4	7.3	39.7	15.1	7.2	47.7
Urban	12.0	11.2	93.3	11.1	12.1	108.8
Lowest quintile	13.0	3.0	22.6	11.0	2.2	20.4
Mid quintile	14.9	7.9	52.9	14.0	7.3	52.0
Highest quintile	6.9	11.0	160.4	5.3	16.3	309.3

Notes: ppt = percentage points, PR = participation rate. Pakistan comprises the four provinces only.
Source: Authors' estimates using the 2010/11 PSLMS and the 1998/99 PIHS. All statistics are estimated accounting for survey sampling weights.

Table 12: Mean characteristics of private school students, 1998/99, 2004/05, and 2010/11

	6–10 age group			11–15 age group		
Characteristic	2010/11 (1)	Diff. from 2004/05 (2)	Diff. from 1998/99 (3)	2010/11 (4)	Diff. from 2004/05 (5)	Diff. from 1998/99 (6)
Age (in complete years)	7.915	0.023	0.023	12.832	0.064***	0.234***
	(1.411)	(0.018)	(0.033)	(1.370)	(0.024)	(0.050)
Female	0.444	–0.002	–0.013	0.444	–0.008	0.014
	(0.497)	(0.007)	(0.012)	(0.497)	(0.011)	–0.021
Rural	0.450	0.002	0.091**	0.423	0.006	0.115***
	(0.498)	(0.033)	(0.041)	(0.494)	(0.036)	(0.044)
Lowest (first) HH asset index quintile	0.070	0.022***	0.018*	0.045	0.011**	0.006
	(0.256)	(0.007)	(0.010)	(0.208)	(0.005)	(0.010)
Mid (third) HH asset index quintile	0.199	0.018*	0.009	0.172	0.025**	0.023
	(0.399)	(0.010)	(0.016)	(0.378)	(0.011)	(0.018)
Highest (fifth) HH asset index quintile	0.329	–0.056***	–0.109***	0.408	–0.048**	–0.094***
	(0.470)	(0.016)	(0.025)	(0.491)	(0.020)	(0.030)
HH head's highest ed.: no schooling	0.264	–0.049***	–0.024	0.245	–0.036***	–0.025
	(0.441)	(0.012)	(0.020)	(0.430)	(0.014)	(0.022)
HH head's highest ed.: grades 1–5	0.148	–0.009	–0.028*	0.135	–0.001	–0.028*
	(0.355)	(0.008)	(0.014)	(0.342)	(0.009)	(0.017)
HH head's highest ed.: grades 6–8	0.222	0.013	0.011	0.228	0.002	–0.012
	(0.416)	(0.008)	(0.015)	(0.420)	(0.010)	(0.020)
HH head's highest ed.: grades 9–10	0.142	–0.002	0.007	0.134	–0.006	0.029**
	(0.349)	(0.007)	(0.012)	(0.341)	(0.009)	(0.014)
HH head's highest ed.: grade 11+	0.224	0.047***	0.034	0.258	0.041**	0.036

	6–10 age group			11–15 age group		
	2010/11	Diff. from 2004/05	Diff. from 1998/99	2010/11	Diff. from 2004/05	Diff. from 1998/99
Characteristic	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
	(0.417)	(0.012)	(0.023)	(0.437)	(0.017)	(0.024)
HH size	7.773	–1.958***	–0.563***	7.499	–1.649***	–0.813***
	(3.479)	(0.139)	(0.161)	(3.128)	(0.134)	(0.227)
Children aged 6–10 in HH	1.997	–0.303***	–0.088**	1.094	–0.299***	–0.251***
	(0.952)	(0.036)	(0.044)	(1.072)	(0.037)	(0.054)
Children aged 11–15 in HH	0.918	–0.239***	–0.155***	1.874	–0.211***	–0.120**
	(1.005)	(0.026)	(0.040)	(0.823)	(0.028)	(0.050)

Notes: HH = household. Pakistan comprises the four provinces only.
Standard deviations are reported in parentheses in columns (1) and (4). Standard errors are reported in parentheses in columns (2), (3), (5), and (6); these are estimated accounting for clustering at the PSU level.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$ (two-tailed significance tests).
Source: Authors' estimates using the 2010/11 and 2004/05 PSLMS and the 1998/99 PIHS. All statistics are estimated accounting for survey sampling weights.

Figure A1: Distribution of private school students, 6–10 age group, 2010/11

Figure A2: Distribution of private school students, 11–15 age group, 2010/11

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Migration, Remittances, and Household Welfare: Evidence from Pakistan

Masood Sarwar Awan[*], **Mohsin Javed**[**], **Muhammad Waqas**[***]

Abstract

This study examines the costs and household-level benefits of overseas migration in Toba Tek Singh, Pakistan. A household survey was conducted to assess the transaction costs associated with the transfer of remittances and the sources used to finance overseas migration. We also carry out a propensity-score matching exercise, which reveals that overseas migration has substantial benefits as measured by migrants' consumption levels, their expenditures on health, education, and vehicles, and the level of household savings. Policy options to facilitate migration and the transfer of remittances include (i) establishing technical training institutions to help workers upgrade their skills, (ii) information campaigns on the migration process and opportunities available, (iii) setting up institutions to provide loans for potential migrants, (iv) reducing money transfer costs through formal channels, and (v) building awareness of the Pakistan Remittance Initiative.

Keywords: International migration, remittances, Pakistan.

JEL classification: I30, F22, F24.

1. Introduction

The role of international migration and remittances in poverty reduction and economic growth is a key issue for most labor-sending countries. Remittances are often an important source of income and help boost growth, particularly in developing countries (Alfieri & Havinga, 2006).

The United Nations News Centre (2013) indicates that 232 million people in the world live outside their country of birth compared with 175 million in 2000 and 154 million in 1990. The World Bank (2015) reports that international migrants numbered about 247 million in 2013; this is projected to increase by another 3 million in 2015. The remittances received by

[*] Associate professor, Department of Economics, University of Sargodha, Pakistan.
[**] MPhil student, Department of Economics, University of Sargodha, Pakistan.
[***] PhD student, Department of Economics, University of Sargodha, Pakistan.

developing countries are three times the size of official development assistance. World Bank estimates show that, globally, remittances totaled US$ 583 billion in 2014, of which US$ 436 billion flowed to developing countries. In 2013, worldwide remittances stood at about US$ 542 billion, of which developing countries accounted for US$ 414 billion. The top four recipient countries included India (US$ 70 billion), China (US$ 60 billion), the Philippines (US$ 25 billion), and Mexico (US$ 22 billion). By 2016, worldwide remittances are projected to reach US$ 700 billion, with developing countries receiving about US$ 540 billion.

In 2013, Pakistan ranked seventh among the top ten countries receiving migrant remittances in the developing world (US$ 14.6 billion). So, Pakistani expatriates play a vital role in the country's economic development, boosting its foreign exchange earnings.

The important questions with respect to migration are (i) to what extent this potential can be realized and (ii) whom it benefits. Typically, the upfront costs of migrating and securing employment in a foreign country are very high. Having to pay agents' fees, visa fees, airfares and other related costs represent a significant burden, especially for the poor. Even after overseas employment has been secured, many potential difficulties can arise in transferring remittances from the host country to the home country. Certain factors such as lack of access to the formal banking system and the costs associated with it compel many people to use informal channels such as the *hundi* or *hawala* system.

Despite the significance of remittances for Pakistan, a limited number of studies have looked at the issues relating to migrant households. This study contributes to the literature by attempting to identify the cost of migration and its impact on household welfare.

2. Literature Review

Much of the literature on remittances focuses on the role of migration in development and poverty reduction. Adams and Cuecuecha (2010), for instance, argue that international remittances have a substantial effect on poverty. Similarly, Gupta, Pattillo, and Wagh (2009) conclude that remittances have a direct poverty-mitigating effect and a positive impact on financial development. Lokshin, Bontch-Osmolovski, and Glinskaya (2010) find that international remittances and increased migration had reduced poverty in Nepal by as much as 20 percent.

Acosta, Fajnzylber, and Lopez (2007) show that remittances lower poverty levels, albeit to a moderate degree. Koc and Onan (2004) analyze the use of remittances as a poverty reduction strategy and find that it yields positive results. In a study of 33 African countries, Anyanwu and Erhijakpor (2010) find that international remittances had reduced the level, depth, and severity of poverty.

Most studies show that remittances have a positive impact on household welfare. Maphosa (2007) finds that remittances improve living standards, attitudes to education, and access to health facilities, especially in times of financial difficulty. Similarly, Sharma and Zaman (2009) report that international migration carries substantial benefits for migrant households relative to nonmigrant households. They also analyze the cost of migration and the different channels used to transfer remittances.

Sharma (2013) assesses household wellbeing in the western province of Sri Lanka taking into account international contract-based migration. He reports that different types of expenditure are significantly higher among migrant households, including food, nonfood, and health expenditures. Similarly, Jones and Kittisuksathit (2003) observe that returned international migrants enjoy a far higher quality of life than nonmigrant households. Nguyen (2008) supports this finding and shows how international migration improves welfare.

Some studies, however, report that international migration can also have adverse consequences. Halpern-Manners (2011), for example, finds that migration is negatively related to educational outcomes and economic activity among Mexican youth and adults. Milligan and Bohara (2007) conclude that migration has a positive impact on child welfare, but argue that the increase in remittances should not come at the cost of other sources of income, which might otherwise affect child welfare negatively.

The literature on the impacts of migration in Pakistan is limited. Mansuri (2006) and Arif and Chaudhry (2015) notes that international migration has a significant positive effect on school attainment and child labor in rural Pakistan. They also find that it has a positive impact on human capital accumulation with greater migration gains for girls, thus reducing gender inequality in access to education to a substantial degree.

Studying the use of remittance inflows, Airola (2007) observes that, although recipient households tend to engage in conspicuous—rather than productive—consumption, remittance income improves their overall living

standards and helps boost the economy. Crush and Frayne (2007) agree, pointing to the positive role of migration in economic development.

Given that simple comparisons give biased results, McKenzie, Gibson, and Stillman (2006) suggest choosing an appropriate instrumental variable. Other options include the difference-in-difference approach and propensity-score matching (PSM) method. Heinrich, Maffioli, and Vázquez (2010) and D'Agostino (1998) also point to the increasing use of PSM for policy evaluation purposes, where there is less control over the treatment group, such as in observational studies.

Clearly, in most cases, international migration reduces poverty, improves household wellbeing, reduces unemployment, and has a positive impact on investment as migrants have far higher saving levels than nonmigrants. Although international migration is seen to affect consumption, the purchase of durables, health, and education, its impact on the latter two is mixed. Overall, however, international migration has a positive impact at the household as well as country level, especially in the context of developing countries.

3. Data and Sampling

A questionnaire was designed and administered among a sample of 250 households in Toba Tek Singh district, Punjab, to obtain data on their demographic characteristics, the migration process, and the volume of remittances received and sent. Additionally, qualitative discussions were held with respondents to record their perception of migration, the receipt of remittances, its associated benefits, and any other related issues.

In the initial phase of the survey, key informant interviews were conducted with a number of travel agents and private labor exporting agencies in Toba Tek Singh to identify areas where migration was most prevalent. This exercise yielded a list of 25 such villages, of which 10 villages[1] were selected at random for the final survey. Given that migrant households represented only a small fraction of the total number of households, the former were oversampled to ensure they were adequately represented in the household survey. Thus, half are migrant households and the other half, nonmigrant households.

[1] Our key informants identified 25 such villages (*chaks*), of which 10 were selected at random: 324 JB, 297 GB, 517 GB, 330 GB, 336 GB, 342 GB, 331 GB, 341 GB, 332 GB, and 349 GB.

In each selected village, 25 households were selected randomly, alternating between a choice of 13 migrant and 12 nonmigrant households in one village and 12 migrant and 13 nonmigrant households in the next to maintain the correct balance. As far as possible, the survey team tried to ensure they interviewed the household head; if this was not possible, then any adult familiar with the household's affairs was invited to respond instead. This is important because, in migrant households, the migrating member may be the head of the household.

4. Methodology

Given the binary dependent variable, we use a logit model to assess the different factors affecting migration, thus transforming probabilities into log odds. More formally, let Y be the binary response variable with a value of 1 if the household has a migrant member and 0 otherwise. P represents the probability of Y as 1:

P = Prob (Y = 1)

Let X_1, X_2, …, X_{11} represent the different predictor variables.

The logistic regression takes the following form with parameter values estimated using the maximum likelihood method:

$$Logit\ (p) = \log\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_{11} X_{11} \quad (1)$$

In terms of probabilities, equation (1) above translates into

$$P = \frac{\exp(\beta_0+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_{11} X_{11})}{(1+\exp(\beta_0+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_{11} X_{11}))} \quad (2)$$

As exactly half the sample comprises migrant households and the other half nonmigrant households, the analysis may be biased in the traditional sense due to the lack of randomization (randomization is important in that two groups being treated differently should be comparable). In an observational study, the researcher does not randomly allocate treatments that are beyond the control of the investigator, which can result in inconsistent and biased estimates.

The estimation method used in this study to assess household-level impacts tackles the problem of potential endogeneity and other data limitations, given that migrants and nonmigrants are not identical. Households that provide members the chance to migrate may be better

socially networked than those that do not. Hence, if the observable data cannot capture relevant household characteristics, the impact estimates may be biased between the two groups.

In this situation, PSM provides the most accurate estimates of the impact of migration when using nonexperimental design methods. Dehejia and Wahba (2002) find that PSM yields consistent and compatible results for the experimental benchmark estimate and examine LaLonde's (1986) evaluations in an observational study.

Let Y_i^1 be the outcome of the *i*th household if it migrates and Y_i^0 the outcome if it does not migrate. Thus, the impact of migration is

$$\Delta = Y_i^1 - Y_i^0$$

However, either Y_i^1 or Y_i^0 are observable in each case.

Let D indicate the household's migration status, where D is 1 if the household has a migrant member and 0 otherwise. The average impact of migration is given by

$$E(\Delta|X, D = 1) = E(Y_1 - Y_0|X, D = 1) = E(Y_1|X, D = 1) - E(Y_0|X, D = 1) \quad (3)$$

X is a vector of control variables. This measure is referred to as the average impact of the treatment on the treated.

In the above expression, $E(Y_0|X, D = 1)$ is not observed. PSM provides a method for estimating this counterfactual (Rosenbaum & Rubin, 1983).

Let P(X) = Pr(D = 1 | X) be the probability of having a migrant family member. PSM is used to construct a comparison group by matching observations with similar values of P(X) of migrants to nonmigrants, with two assumptions:

$$E(Y_0 | X, D = 1) = E(Y_0 | X, D = 0) \quad (4)$$

$$0 < P(X) < 1 \quad (5)$$

Equation (4) is known as conditional mean independence and indicates that, after controlling for X, the average outcomes of nonmigrants are identical to those of migrants in the counterfactual situation that they

did not migrate. Equation (5) assures valid matches by assuming that P(X) is well defined for all values of X.

Large values of X (the number of characteristics used in matching) can give rise to the "curse of dimensionality" problem, i.e., as the number of characteristics used in matching increases, the chances of finding an exact match are reduced.

Rosenbaum and Rubin (1983) address this problem by suggesting that beneficiaries and nonbeneficiaries be matched solely on the basis of their propensity scores—that is, the estimated probability of being a migrant household, given all observable characteristics. Intuitively, each beneficiary is matched to a nonbeneficiary with the closest probability. Importantly, there is a substantial difference between the outcomes of matched migrants and matched nonmigrants from the observed difference between migrants and nonmigrants.

In order to estimate the propensity scores, the logit model includes both the determinants of migration and the factors that affect consumption outcomes. A probit model could also be used, given that the distribution of both models is almost the same except that different cumulative distribution functions are employed. We then assess the common support of distributions for migrants and nonmigrants, which indicates a substantial overlap between the two—this meets the basic requirement for matching. As mentioned above, we have used different matching techniques to estimate household-level impacts. Average effects are estimated by taking the difference between the treated (matched migrant households) and control (matched nonmigrant households) groups. Bootstrapping has been used for impact estimates with 1,000 replications for each estimate.

5. Empirical Results and Interpretations

This section describes the results of the household survey and estimates the household-level impact of migration and remittances.

5.1. Characteristics of Migrant Households

The household survey carried out in the ten randomly selected villages shows that international migrants are, on average, 33 years old; 87 percent are male and 13 percent are female (as shown in Table 1). Married individuals are more likely to migrate, accounting for 65 percent of all migrants. On average, migrants have completed nine grades of schooling.

Table 1: Descriptive statistics for international migrants

Variable		Value
Age	Mean (years)	33.09
Education level	Mean (years)	9.06
Sex	Percent	
Male		86.90
Female		13.10
Marital status	Percent	
Married		64.60
Unmarried		34.80

Source: Authors' household survey.

Table 2 shows that Saudi Arabia is the most popular destination for overseas migration (accounting for 38 percent of migrants), followed by the UK (30 percent), and the UAE (16 percent). the table also shows that migration to other countries such as the US, Kuwait, and Bahrain is not as significant.

Table 2: Most common migrant destinations

Country	Percent
UK	29.6
US	1.6
Saudi Arabia	38.4
Kuwait	0.8
Bahrain	1.6
UAE	16.0
Others	12.0

Source: Authors' household survey.

5.2. Costs Associated With Overseas Migration

Table 3 shows that in most cases (61 percent), friends and relatives in the destination country helped potential migrants relocate, while about 30 percent of all migrants relied on an agent to facilitate the process (Table 3).

Table 3: Primary agent facilitating migration

Primary agent facilitating migration	Percent
Agent-based	29.6
Friends and relatives in the destination country	60.8
Directly recruited by employer	9.6
Total	100.0

Source: Authors' household survey.

The total cost incurred in the process includes agents' fees, the cost of a passport, visa fees, the cost of air travel, and other relevant permits. The mean value of the total upfront fee is PRs 197,492 while the median value is PRs 165,000, indicating that some migrants have to pay more (which is likely related to differences in airfare and visa and work permit fees).

As Table 4 shows, there is also a time-cost involved in preparing and finalizing migration-related documents and making the necessary travel arrangements. The average total time-cost is about five months. The necessary time-cost is 20 days (the number of days spent outside the home to complete the paperwork needed).

Table 4: Average time-cost incurred by international migration

Value	Total time-cost (months)	Necessary time-cost (days)
Mean	4.85	20.21
Median	4.00	18.00

Source: Authors' household survey.

Table 5 shows that about 45 percent of the migrant households reported having used grants from family members to finance their migration. Just under 22 percent had relied on their own cash resources and the same proportion said they had borrowed from friends and relatives (Table 5). Other sources of financing, such as commercial lenders and the sale of land or other assets, are not as significant.

Table 5: Sources of financing for overseas migrants

Source of financing	Percent
Own cash resources	21.6
Grant from family members	44.8
Borrowed from friends and relatives	21.6
Borrowed from commercial lender	0.8
Money from mortgaging land	3.2
Sold land or other assets	6.4
Others	1.6
Total	100.0

Source: Authors' household survey.

5.3. Remittance Receipt and Processing

For the whole sample, table shows that the mean annual remittance per migrant is PRs 473,608 while the median amount is much smaller (PRs 370,000). This is likely because some migrants are able to remit larger amounts than others (Table 6).

Table 6: Annual receipt of remittances

Annual receipt of remittances	Value
Average amount received per year (PRs)	
Mean	473,608.00
Median	370,000.00
Frequency per year	
Mean	10.06
Median	12.00

Source: Authors' household survey.

On average, remittances are received ten times a year, implying that almost all households receive remittances roughly every month (shown in Table 6). As Table 7 shows, Saudi Arabia accounts for the largest percentage of remittances at 37 percent, followed by the UK (31) percent, and the UAE (16 percent). This reflects the data in Table 2 on the most common destination countries for migrants.

Table 7: Percentage of remittances received from each country per year

Country	Percent
UK	31.2
US	1.6
Saudi Arabia	36.8
Kuwait	0.8
Bahrain	1.6
UAE	16.0
Others	12.0
Total	100.0

Source: Authors' household survey.

Almost 40 percent of recipient households use their own bank accounts for remittance transfer and 32 percent rely on money transfer companies (as shown in Table 8). The role of the hundi/hawala system remains significant: almost 21 percent of households report using this medium to transfer remittances.

Table 8: Different modes of receipt

Mode of receipt	Percent
Personal delivery by friends or relatives	5.6
Money transfer company	32.0
Direct transfer to own bank account	39.2
Transfer to a third-party bank account	1.6
Check or bank draft	0.8
Hundi/hawala	20.8

Source: Authors' household survey.

Finally, when asked what attribute they considered most important with respect to remittance modes, 78 percent said they valued reliability and thus used their own bank accounts to transfer remittances. About 50 percent of recipient households reported using the hundi/hawala system because it was cheaper than formal channels (as shown in Table 9).

Table 9: Reasons for choosing a particular mode of transfer

Mode of transfer	Characteristic valued most (percent)				
	Speed	Reliability	Proximity	Low cost	Other
Personal delivery by friends and relatives	0	57	14	14	14
Money transfer company	71	21	2	5	0
Direct transfer to own bank account	10	78	10	2	0
Transfer to a third-party bank account	100	0	0	0	0
Check or bank draft	100	0	0	0	0

Source: Authors' household survey.

5.4. Household-Level Impacts of Migration and Remittances

As mentioned above, the logit model includes the determinants of migration as well as the factors that affect consumption outcomes. Figure A1 in the Appendix illustrates the substantial overlap between the characteristics of migrants and nonmigrants (common support), which allows us to use the PSM technique. The PSM scores are calculated based on the determinants of migration.

The variables that are statistically significant include: agricultural land before migration, the business of the household head before migration, the number of adult females, adult females with primary schooling, and the presence of friends and relatives in the destination country (see Table A1 in the Appendix). This is line with the literature.

5.4.1. Local Linear Matching

Local linear matching (LLM) is a nonparametric matching estimator similar to kernel matching, but with the difference that LLM includes—in addition to the intercept—a linear term in the propensity score of a treated individual. This is an advantage when comparison group values are distributed asymmetrically or when there are gaps in the propensity score distribution. LLM uses the weighted average of all individuals in the control group to construct a counterfactual outcome. It assigns a higher weight to observations with closer propensity scores and a lower weight to those farther apart. Figure A2 in the Appendix illustrates the density of the untreated (control) observations, treated observations, and off-support observations. This exercise yields the following results.

1. The difference between monthly per capita total expenditures, monthly per capita food expenditures, and monthly per capita nonfood expenditures between matched migrant households and matched nonmigrant households is statistically significant. All cases indicate statistically significant expenditures for migrant households.
2. Analyzing other components, such as monthly per capita expenditures on clothing, health, and education, reveals that migrant households spend significantly more than nonmigrants. We find this difference to be statistically significant, although the literature yields mixed results.
3. As expected, migrant households have higher liquidity and are better able to finance expenditures, particularly on vehicles, appliances, and kitchen items. Again, in all cases, migrant households spend significantly more on such items than nonmigrants.
4. A priori, we would expect migrant households to save a significant part of their remittances. This is borne out by the results: there is a significant difference in annual cash savings between migrant and nonmigrant households, with the former saving almost nine times as much as the latter.
5. The volume of outstanding loans for migrant households is not significantly higher. Although they face high upfront costs relating to migration, they are likely to return these loans on a priority basis.
6. Migrant households spend more on the purchase of agricultural land and the difference between the two groups is significant.

Overall, we find that migration and remittances have a positive and significant impact on food and nonfood expenditures, clothing expenditures, health expenditures, education expenditures, the level of cash savings, and changes in agricultural land. The difference between the two groups with respect to outstanding loans is not found to be significant (see Table A2 in the Appendix).

5.4.2. Bootstrapped Standard Errors for Impact Estimates

Bootstrapping is a technique through which accuracy measures are assigned to sample estimates, thus allowing one to estimate the sampling distribution of almost any statistic. It can be used to test hypotheses when the parametric assumptions are in doubt or the formulae too complicated to compute standard errors.

One problem this study faces is that the estimated variance of the treatment effect should also include the variance due to the estimation of the propensity score, the imputation of the common support, and the order in which treated individuals are matched. In this way, the variance goes beyond the normal sampling variation.

This problem is tackled using bootstrapping. Table A3 in the Appendix reports the bootstrapped standard errors and t-statistic values for different matching techniques. The results show that all estimations are compatible and match our findings well.

5.5. Qualitative Analysis

Most migrants surveyed had been unemployed workers in their home country with few technical skills and, as a result, low wages. We also found that people were not aware of a wider range of job opportunities available abroad.

5.6. Balancing Tests

The study employs the following tests:

- Standardized test for percentage bias
- Test for equality of means

If the conditional independence assumptions hold and exposure to treatment is random, then the matched migrant and matched nonmigrant households should be, on average, identical. Standardized bias is the difference between the sample means of the treated and nontreated (full or matched) subsamples as a percentage of the square root of the average of the sample variances in the treated and nontreated groups. The t-statistic value for equality of means should not be significant. All the variables used in this study pass the balancing tests (see Table A4 in the Appendix).

6. Conclusion and Policy Implications

The purpose of this study was to analyze the different costs facing the poorest migrant households and to investigate the effect of remittances on household welfare. Overall, our results show that migration has a significant and positive impact on all the outcome variables. International migration appears to have improved the wellbeing of the sample migrant households and, in future, its impact is expected to be even stronger.

The results also indicate that the upfront fee required for overseas migration is about PRs 200,000, which is considerably high for a poor household, while the average size of remittances received per year is about PRs 475,000. The largest inflows are from Saudi Arabia. The hundi/hawala system still plays an important role, accounting for 21 percent of the total inflow of remittances, and is associated with a lower transfer cost.

International migration clearly improves household wellbeing: we have observed statistically significant differences between migrant and nonmigrant households with respect to the mean level of per capita total expenditure; per capita expenditure on food, nonfood, health, and education; annual expenditure on appliances and vehicles; the level of savings; and the change in agricultural land. Although migrant households tend to invest more in real estate than in purchasing agricultural land, the change in agricultural land remains significant.

Given the positive and significant impact of international migration on household welfare, the government should formulate a well-defined migration policy and sign bilateral agreements with other countries to enhance migration as a tool to reduce unemployment and poverty.

Migrant earnings—based on the annual average remittances received—are still low, given the low level of skills and technical expertise. Upgrading migrants' skills would improve their wage levels and increase remittance inflows. This requires establishing technical training institutions to allow migrants to eventually avail a wider set of job opportunities abroad. Additionally, the lack of awareness among prospective migrants of migration opportunities and reported cases of exploitation could be addressed through information campaigns and services. The establishment of institutions that offer easy terms (especially in less developed areas) on loans for migration would reduce the financial burden of migrating.

Having identified the important role of informal transfer channels, which are cheaper and easier to access, we recommend improving access to channels such as the Pakistan Remittance Initiative, which allows people living abroad to remit funds free of charge and free of taxes. The government should also launch an information campaign to spread awareness of this service and to help migrants understand the losses associated with informal transfer channels. This would encourage more people to use formal channels to transfer remittances.

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Appendix

Figure 1: Common support required for PSM

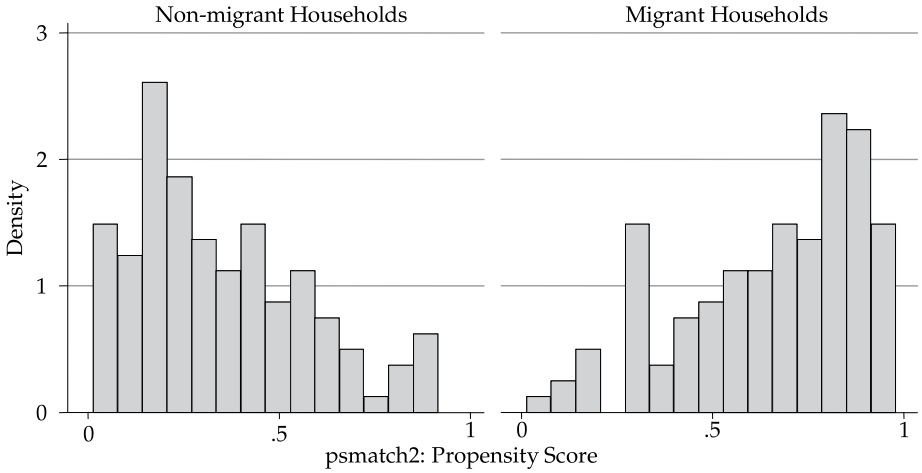

Figure 2: Visual analysis of treated and untreated (control) observations

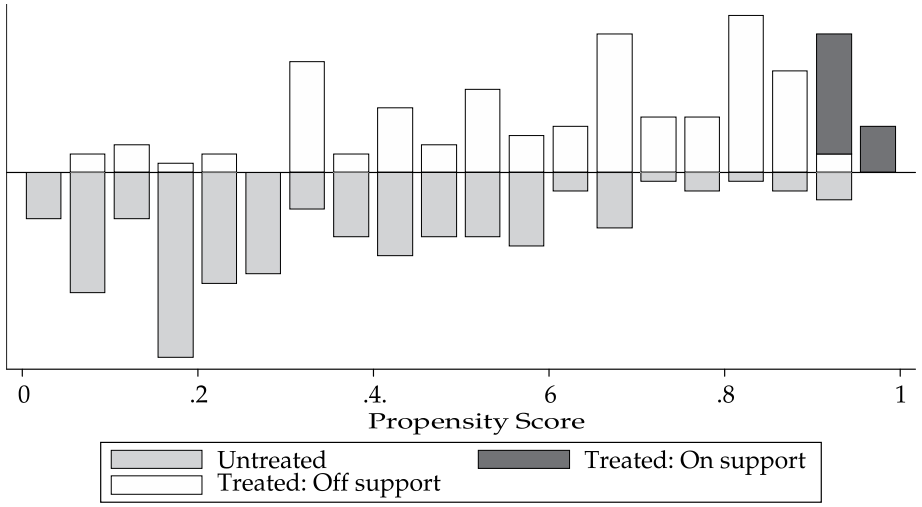

Table A1: Determinants of migration status (logit probability model)

Dependent variable = migration status

Variable	Coefficient	Standard error	T-statistic
Home area before migration	0.007313	0.030104	0.24
Agricultural land before migration	-0.111950	0.036849	-3.04**
Business of household head before migration (Nonagricultural = 1, otherwise = 0)	-1.306060	0.361867	-3.61**
Household head's occupation before migration (Wage laborer = 1, otherwise = 0)	0.882882	0.569082	1.55
Number of adult males	0.506220	0.436478	1.16
Number of adult females	-0.675480	0.328461	-2.06**
Adult males with primary schooling	-0.003490	0.425317	-0.01
Adult females with primary schooling	0.603828	0.323550	1.87*
Household head's education level	0.019502	0.060380	0.32
Spouse's education level	-0.002520	0.005287	-0.48
Maximum education among adults	0.168232	0.075440	2.23**
Friends and relatives in destination country (Yes = 1, no = 0)	2.050815	0.338733	6.05**
_cons	-2.687060	0.744153	-3.61**

Note: * and ** denote significance at 10% and 5%, respectively.
Source: Authors' calculations.

Table A2: Household-level impacts of migration and remittances (LLM)

Outcome variable	Sample	Treated	Control	Difference	T-statistic
Monthly per capita total expenditures	Unmatched	6,715.616	2,877.352	3,838.264	10.11
	ATT	6,703.533	2,856.038	3,847.494	
Monthly per capita food expenditures	Unmatched	3,325.104	1,529.536	1,795.568	8.05
	ATT	3,321.598	1,514.252	1,807.346	
Monthly per capita nonfood expenditures	Unmatched	910.208	396.632	513.576	7.63
	ATT	882.215	386.1463	496.0687	
Monthly per capita clothing expenditures	Unmatched	289.048	101.344	187.704	9.66
	ATT	275.0187	104.115	170.9037	
Monthly per capita health expenditures	Unmatched	740.248	373.84	366.408	6.26
	ATT	772.7196	381.1806	391.539	
Monthly per capita education expenditures	Unmatched	1,073.488	411.832	661.656	5.33
	ATT	1,089.065	398.2518	690.8136	
Monthly per capita expenditure on utensils	Unmatched	202.72	55.6	147.12	12.07
	ATT	200.0748	59.98856	140.0862	
Annual expenditure on appliances	Unmatched	6,645.064	1,135.2	5,509.864	11.70
	ATT	6,529.28	1,394.651	5,134.629	
Annual expenditure on vehicles	Unmatched	20,382.4	2,248	18,134.4	5.03
	ATT	21,199.07	2,503.996	18,695.07	
Annual cash savings	Unmatched	110,026.4	11,783.2	98,243.2	8.50
	ATT	102,488.8	15,128.25	87,360.53	
Outstanding loans	Unmatched	18,664	9,632.56	9,031.44	1.45
	ATT	20,869.16	8,126.482	12,742.68	
Change in agricultural land	Unmatched	1.9536	0.344	1.6096	3.58
	ATT	1.71215	0.151376	1.560773	

Source: Authors' calculations.

Table A3: Household-level impacts of migration and remittances (bootstrapped standard errors for LLM)

Outcome variables	Observed coefficient	Bootstrapped SE	T-stat.
Monthly per capita total expenditures	3,847.494	489.4818	7.86**
Monthly per capita food expenditures	1,807.346	277.214	6.52**
Monthly per capita nonfood expenditures	496.0687	98.25386	5.05**
Monthly per capita clothing expenditures	170.9037	25.8406	6.61**
Monthly per capita health expenditures	391.539	95.02494	4.12**
Monthly per capita education expenditures	690.8136	156.5896	4.41**
Monthly per capita expenditure on utensils	140.0862	15.90433	8.81**
Annual expenditure on appliances	5,134.629	560.191	9.17**
Annual expenditure on vehicles	18,695.07	4,117.144	4.54**
Annual cash savings	87,360.53	12,417.43	7.04**
Outstanding loans	12,742.68	8,506.773	1.50
Change in agricultural land	1.560773	0.533083	2.93**

Note: * and ** denote significance at 10% and 5%, respectively.
Source: Authors' calculations.

Table A4: Matching quality for LLM

Variable		Mean		%bias	% reduction in |bias|	T-stat.
		Treated	Control			
Home area before migration	Unmatched	9.256	8.216	14.8		1.17
	Matched	8.1682	7.5047	9.5	36.2	0.85
Agricultural land before migration	Unmatched	3.6324	3.713	-1.4		-0.11
	Matched	3.7131	3.4729	4.3	-198.1	0.30
Business of household head before migration	Unmatched	0.36	0.536	-35.8		-2.83**
	Matched	0.37383	0.42056	-9.5	73.4	-0.70
Household head's occupation before migration	Unmatched	0.096	0.128	-10.1		-0.80
	Matched	0.09346	0.16822	-23.6	-133.6	-1.62
Number of adult males	Unmatched	2.56	1.96	46.6		3.68**
	Matched	2.3364	2.4299	-7.3	84.4	-0.53
Number of adult females	Unmatched	2.024	1.752	25.7		2.03**
	Matched	1.8972	2.1215	-21.2	17.5	-1.51
Adult males with primary schooling	Unmatched	2.376	1.736	50.3		3.98**
	Matched	2.1589	2.2617	-8.1	83.9	-0.59
Adult females with primary schooling	Unmatched	1.68	1.264	40.2		3.18**
	Matched	1.5421	1.6542	-10.8	73	-0.81
Household head's education level	Unmatched	7.912	7.144	18.3		1.45
	Matched	7.972	7.5888	9.1	50.1	0.73
Spouse's education level	Unmatched	16.888	17.168	-0.9		-0.07
	Matched	18.664	12.794	19.1	-1,996.1	1.47
Maximum education among adults	Unmatched	11.568	9.96	53.8		4.26**
	Matched	11.299	10.533	25.7	52.3	2.03
Friends and relatives in destination country	Unmatched	0.616	0.224	86.2		6.81**
	Matched	0.5514	0.61682	-14.4	83.3	-0.97

Note: * and ** denote significance at 10% and 5%, respectively.
Source: Authors' calculations.

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Implications of Public External Debt for Social Spending: A Case Study of Selected Asian Developing Countries

Sadia Shabbir* **and Hafiz M. Yasin****†**

Abstract

For developing countries with budgetary and balance-of-payments gaps to meet, maintaining large stakes of external debt is not free of cost. Highly indebted countries have to set aside a sizeable fraction of their scarce resources to service their debt, which naturally affects their development spending in general and allocations for the social sector in particular. This study examines the behavior of seven developing Asian countries and analyzes the impact of public external debt on social sector spending. The panel dataset includes Pakistan, India, Bangladesh, Sri Lanka, Nepal, the Philippines, and Indonesia, and spans the period 1980–2010. Our empirical analysis is based on three interrelated equations for different spending categories, which are estimated using the general method of moments. The study's results confirm the common wisdom that outstanding external debt and its servicing liability have an adverse impact on public spending, particularly on social sector spending. This suggests that developing countries need to mobilize their own resources and minimize their dependence on external borrowing as far as possible.

Keywords: Public debt outstanding, debt servicing, fiscal deficit, current account deficit, social sector development.

JEL classification: H69.

1. Introduction

Access to financial assistance is important to individuals, business organizations, and governments. The "three-gap model" explains why developing countries facing fiscal and balance-of-payments problems often resort to foreign aid.[1] Different variants of this model are frequently

* Associate Professor, International Islamic University, Islamabad.
** International Islamic University, Islamabad.
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[1] From the macro-identity C + I + G + (X – M) = Y = C + S + T + F, one obtains the relationship (I – S) + (G – T) = (M – X). Here, (I – S) shows the resource gap between investment and saving in the private sector; (G – T) shows the budget gap of the public sector; and (M – X) is the trade or foreign exchange gap, which has to be financed through foreign borrowing or foreign capital inflows (F).

used by donor agencies in country analyses to define the relative need for and ability of the government concerned to use foreign aid effectively (Islamov, 2001). However, continued reliance on foreign borrowing is not costless.[2] Servicing accumulated foreign debt absorbs a significant fraction of the meager resources generated through exports and remittances. This, in turn, creates the need for further borrowing and widens the fiscal deficit. Data from developing countries reveal that cutting down on current (nondevelopment) expenditure is seldom feasible. The final outcome is straightforward: debt servicing adversely affects ongoing development projects and allocations for social sectors such as health and education.

External borrowing is considered important for developing countries because it increases their access to foreign resources in order to finance imports (equipment and material) meant for development projects. The practice of borrowing may be useful in the short run, but it has important long-run consequences: resources have to be generated first through exports and then used to pay back and service the outstanding debt.

All this depends on the careful and efficient use of the borrowed funds. It is not possible for the central bank to print the hard currency (foreign exchange) needed to repay external debt, and so external borrowing is often associated with vulnerability and debt crises (Rais & Anwar, 2012). The case of domestic public borrowing is somewhat different. The government can easily raise fresh loans to repay mature bonds. The resources are then simply transferred from one hand (taxpayers) to the other (bond holders) in the case of domestic debt servicing.

Many developing countries' government liabilities have increased due to rising interest payments, price hikes of oil imports, and unfavorable conditions in the international markets for their primary exports. As a result, they are caught in a vicious circle of deficit and debt: the increasing budget and trade deficits lead to more borrowing while debt accumulation over time causes the fiscal deficit to widen further. Their current expenditure has also risen over time due to overspending, and this behavior is also motivated by the availability of foreign aid and easy borrowing (Shonchoy, 2010).

[2] Here, we do not discuss the social and political costs of indebtedness, which countries may have to bear in the form of loss of integrity and freedom in decision-making.

Post-1980s, most low-income developing countries have relied on external borrowing to finance development programs in infrastructure, construction, power generation, and the social sector. Development of these sectors is important to raise people's living standards. The impact of external debt on social sector spending is a controversial issue. Mahdavi (2004), for example, emphasizes spending cuts and higher revenues, and suggests distributing the total cuts appropriately among the various categories of public spending in order to reduce the fiscal deficit.

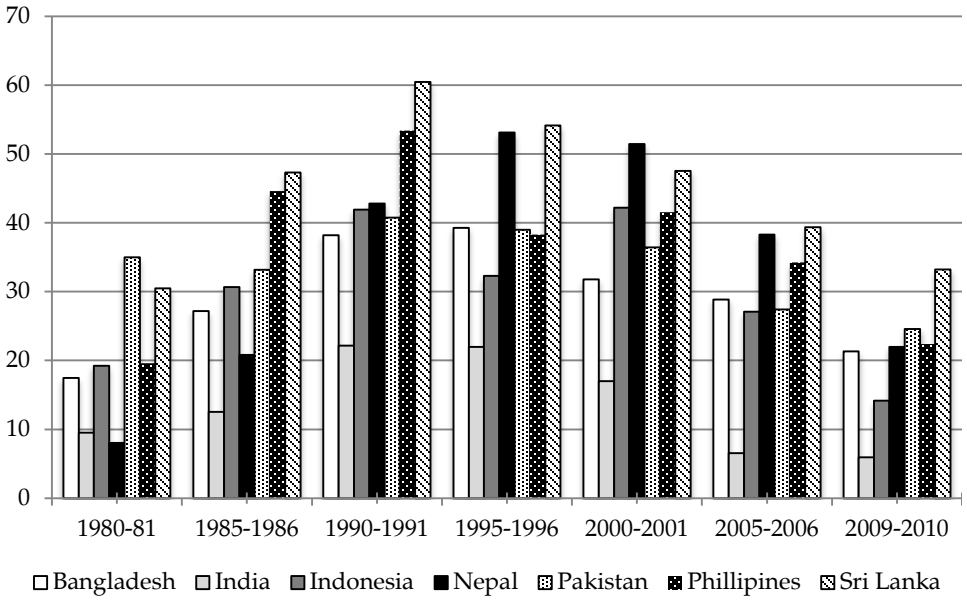
However, a reduction in current spending by the government is often difficult, given the adverse effect on welfare and employment, which can exacerbate public discontent and political instability. If, however, the funds released from cuts in current spending are applied carefully to enhance productivity, then this strategy may be effective for economic growth in the long run. This holds particularly for those developing countries where the public sector is the main provider of employment and the major source of investment in infrastructure and fixed capital formation.

High stakes of debt lead to greater servicing liability. Increasing dependence on foreign borrowing is reflected in commonly used indicators such as the ratio of outstanding debt to GDP and the ratio of debt servicing to export earnings. The debt–GDP ratio not only reflects the burden on a country's productive capacity, but also provides an insight into the sustainability of foreign debt in the long run. An increasing debt–GDP ratio implies that the growth rate of debt is higher than the growth rate of real GDP. This leads to a serious situation when the volume of foreign debt becomes unsustainable.

This increasing foreign dependency can be visualized by looking at the patterns of different debt indicators. Generally, these include the level of outstanding debt and debt servicing as ratios to GDP or foreign exchange reserves. The debt crisis in many developing countries emerged in the 1980s and peaked in the 1990s.

Figure 1 illustrates the position of selected Asian countries in terms of their outstanding external debt burden (debt-to-GDP ratio) from 1980 to 2010. In all cases, the external debt stock increases from 1980 to the 1990s, peaking in 1991. Thereafter, however, most countries return to roughly their 1980 position. This improvement may have been due to an increase in GDP rather than any considerable reduction in the stake of debt.

Figure 1: Relative position of selected Asian countries: External debt-to-GDP ratio



1.1. Relationship Between Outstanding Debt and Social Sector Spending

Public expenditure is an important determinant of economic growth and governments in developing countries have to spend appropriately in social sectors such as education and health. However, debt servicing can adversely affect constructive fiscal allocations in low-income countries. The very objective underlying foreign borrowing (to promote development) is depressed by servicing liabilities, which consumes a sizeable part of the scarce resources generated through exports and/or foreign remittances, and little is left behind to finance development.

However, since investment in the social sector is not directly productive, allocations for education and healthcare provision remain largely neglected in the budgeting process and fiscal considerations. This decelerates human capital development, with an indirect adverse impact on growth and the productivity of new investment in physical capital. Debt servicing shifts resources away from the social sector, especially health and education (Fosu, 2008). This is mainly because it is difficult for the government to cut down on other nondevelopment or recurring expenses.[3]

[3] The Appendix illustrates the relationship between debt servicing and public spending.

Although the International Monetary Fund (IMF) proposed (or imposed) structural adjustment programs to reduce the volume of debt liability and ensure debt repayment, these have not worked well in developing Asian countries. In many cases, such programs have affected social welfare spending, as predicted by World Bank and IMF reports. Higher taxation and downsizing have led to rising unemployment and income reductions, while the removal of subsidies has caused the market prices of food items to increase, with grave implications for poor households. Thus, rather than alleviate poverty in the countries implementing these programs, they have merely aggravated the economic crisis.

For most developing countries, debt accumulation is seen as the root cause of their financial problems, including widening fiscal deficits. At a meeting of the OECD Development Assistance Committee in 1996, a number of socioeconomic targets were set for borrowing countries to be achieved by 2015, that is, the OECD's assistance to developing countries was tied to visible progress in achieving these goals. Subsequently, the UN General Assembly approved the agenda of the Millennium Development Goals (MDGs) in 2003, which aimed at eradicating poverty and hunger, and providing better health and basic education, accompanied by a sustainable environment. However, most developing countries remain trapped in a vicious debt circle and, therefore, the focus is likely to be diverted from "welfare" to merely "survival." This makes achieving the MDGs a matter of chance in such countries, including Pakistan.

The persistence of heavy outstanding debt is, among other factors, detrimental to economic growth. The reduction in the pace of growth, in turn, implies lower household incomes and poor public revenue collection. Consequently, poverty is likely to rise, with an adverse impact on the social sectors. The dilemma for most developing countries, especially in Asia, is that the rise in nondevelopment expenditure has outstripped spending on the social sectors—to the extent that many governments are divesting themselves of the burden of providing basic health and education, and gradually shifting this to the private sector.

1.2. Objectives and Rationale of the Study

Keeping in view the above, the adverse impact of debt servicing on social sector spending (education and health) in developing countries

is easily understood.[4] Economic theory suggests that any increase in social sector spending will enhance social welfare by generating better employment opportunities in the long run, thereby increasing household income and access to food, education, and healthcare, and reducing the risk of economic adversity. There is a large body of literature on the determinants of government spending and the connection between government revenues and expenditures in developing countries (see, for instance, Snyder & Yackovlev, 2000; Aisha & Khatoon, 2009; Muritala & Abayomi, 2011; Tayeh & Mustafa, 2011).

Few studies, however, have assessed the impact of external debt on fiscal allocations in developing countries. In particular, the nexus between external debt burden and social sector spending needs further exploration. The present study attempts to fill this gap in the literature with reference to developing Asian countries. For this purpose, we have selected a panel of seven countries: Indonesia, the Philippines, Bangladesh, Nepal, India, Pakistan, and Sri Lanka for a 30-year period (1980–2010). These countries are moderately indebted and in somewhat similar stages of economic development. The study aims to determine how and to what extent the social sector is affected by external debt liability in these countries.

The next section briefly reviews the literature. Section 3 describes the model, methodology, and data; the results of the estimation are given in Section 4. Section 5 provides conclusions and policy implications.

2. Literature Review

The impact of external debt on social sector spending is a controversial issue. On the one hand, external borrowing boosts development spending (as is commonly perceived). On the other, debt repayment and servicing affects the government's ability to finance development programs (including social sector spending). The rationale for resorting to external borrowing is, therefore, obvious: developing countries need finances to boost economic growth and ensure smooth progress in all areas, including the social sector. However, the results of this experience of more than half a century have been different for different countries. Generally, public expenditures have increased on

[4] Of course, there are other factors responsible for this odd scenario besides debt liabilities. For instance, one reason may be the perception that providing education and healthcare is not solely the government's responsibility and that the private sector should come forward and contribute to that end. However, this expectation is only partially fulfilled in developing countries. While better-off households now rely on privately managed educational and health institutions, the majority of poor households have no option but to depend on the public sector.

account of debt servicing. In contrast, government revenues have not kept pace, and thus the financing of debt servicing has resulted in public spending cuts in the social sector, especially in education and health.

Most researchers have focused on the determinants of public debt and its relationship with public revenues and expenditures. Many studies emphasize the implications of external capital inflows as well as the role of foreign aid in development programs. However, the literature generally bypasses the impact of the resulting debt stock on such programs or else yields mixed findings. A brief review is given below.

2.1. External Debt Liability and General Public Spending

Njeru (2003) investigates the growing external debt of Kenya and asks whether foreign aid has served as a substitute for domestic resources. Based on time-series data for 1970–1999, he concludes that foreign assistance increased government expenditures and boosted development spending.

McGillivray and Ouattara (2005) develop a link between debt servicing, aid, and fiscal variables for Côte d'Ivoire for the period 1975–99. Using the fiscal response model, they conclude that the bulk of the foreign aid offered to highly indebted poor countries (HIPCs) to meet their public spending needs, especially in the social sector, is misused. A large portion of this aid is used for debt servicing, which then has a negative impact on public spending. Another important result indicates that foreign aid does not induce a decline in borrowing—this finding contradicts the previous argument that public debt and foreign aid are substitutes for one another.

Hyman (2007) tests the contention that a heavy debt burden has had a negative impact on growth and development for the Caribbean states. He finds that external debt grew faster in these countries during the 1990s due to defaults on foreign debt and the jump in oil prices. Analyzing IMF data on the debt–GDP ratio for 1997–2006, the study concludes that governments are bound to reduce spending on basic social services (education and health) and infrastructure development when confronted by heavy debt servicing.

Raju (2008) uses an error correction model to investigate the relationship between government expenditure and revenues in India, using annual data for the period 1950–2003. The gap between expenditure and revenues increases the rate of interest, which in turn raises the cost of

debt servicing and leads to further fiscal imbalances. Although the results are mixed, the study reveals a significant unidirectional causality running from increased revenues to enhanced development expenditures, with a positive impact on management.

Presbitero (2012) uses panel data for 92 low- and middle-income countries for the period 1990–2007. The study finds that public debt has a negative impact on growth up to a threshold of 90 percent of GDP, beyond which its effect becomes irrelevant. This nonlinear effect can be explained by country-specific factors since debt overhang is a constraint to growth in countries with sound macroeconomic policies and stable institutions.

In contrast to the studies above, Wu, Tang, and Lin (2010) attempt to reassess the link between overall government expenditure and development spending by applying Granger causality tests to a panel of 182 countries (categorized by income level) over 1950 to 2004. The study concludes that high-income countries follow Wagner's law and the hypothesis that government spending helps raise public welfare and economic development. However, this is not true for low-income countries where government spending has little impact on economic development as a result of corruption and underdeveloped institutions.

2.2. External Debt Liability and Social Sector Spending

Stephens (2001) argues that debt servicing crowds out public sector "investment spending." Using panel data for 24 African HIPCs, the study finds that the increase in debt servicing has adversely affected expenditure on both education and health, but with a larger impact on the latter.

Baqir (2002) determines the impact of political and institutional factors on social sector spending in developing countries. He uses the "freedom index" as a proxy for the level of democracy and political structure, which is an important interpreter of government spending. Applying an ordinary least squares (OLS) model to panel data for more than 100 countries for the period 1985–98, he finds a strong relationship between democratization and government spending, particularly social expenditures, which implies that the social sector receives more attention in democratic countries.

Fan and Rao (2003) analyze public spending in 44 developing countries across Asia, Africa, and Latin America during 1980–2002. Applying the generalized method of moments (GMM) instrumental variable technique, they conclude that various types of government

spending have a diverse impact on economic growth and development. The study suggests that governments should reduce their spending on defense and unproductive sectors, and focus on productive investment to reduce poverty and boost economic growth and development.

The argument that high debt servicing crowds out government social spending is analyzed by Loko, Mlachila, Nallari, and Kalonji (2003) through the relationship between external debt and poverty. Looking at 67 low-income countries over the period 1985–97, they report that governments most often reduce their spending on the social sectors (health, education, safety nets, and sanitation, etc.) because this is easier for them than making cuts in other sectors.

Mahdavi (2004) analyzes the impact of debt liability on different categories of public expenditure. Based on a sample of 47 developing countries for the period 1972–2001 and employing a random effects model, the study finds empirical evidence to support the view that external debt adversely affects both capital as well as current expenditure if wages and salaries are excluded. However, if wages and salaries are included, then the social sector seems to be protected (not affected by external debt liabilities) since these constitute a large part of social spending.

Ouattara (2006) suggests that external debt can adversely affect government spending in general. However, the social sector is more or less protected. In general, expenditure in capital-intensive sectors is reduced more than proportionately compared to current expenditure. Among the various headings of public expenditure, the infrastructure and productive sectors bear a larger burden in terms of debt servicing adjustments, while the defense and social sectors are relatively protected.

Lora and Olivera (2007) ask whether an increase in public debt (external and internal) affects social expenditures, if this effect depends on the reaction of other variables, and whether public debt affects health and education expenditures in the same way. Using a sample of 50 Latin American countries for the period 1985–2003, the results indicate that a higher debt stock is liable to cut down overall public expenditure and reduce social spending. Both education and health expenditures are adversely affected when the debt increases, but defaulting on it increases the spending on average.

Fosu (2007, 2008) applies a seemingly unrelated regression model to a panel of 35 African countries for the period 1975–94 and concludes that the debt constraint has a negative impact on education and health

expenditures. However, he does not consider allocations to other functional sectors in this study. To fill this gap, he extends the analysis to a multi-sector model and estimates a system of expenditure-share equations simultaneously involving the functional sectors (agriculture, capital, economic services, public investment, education, and health). The study finds that the debt-servicing constraint is liable to shift public expenditure away from the social sectors (health and education) and possibly from public investment.

Fosu (2010) extends this analysis for sub-Saharan Africa, using a reduced-form simultaneous equations model. The study finds that debt servicing has a negative impact on social sector spending, particularly on education.

2.3. Studies on Pakistan

Pakistan has faced fiscal and trade deficit problems from the beginning and relied on domestic and foreign borrowing to fill the gaps. In developing countries, economic development depends largely on public sector spending since the private sector most often follows government initiatives. Although governments in such countries may want to allocate more to the social sectors, the outflows due to heavy debt servicing depress their productive fiscal spending capacity. There is very little work on the link between external debt liability and economic development in Pakistan, but the relevant studies are reviewed below.

Chaudhry, Malik, and Ramzan (2009) find evidence that foreign debt servicing has had a discouraging impact on constructive investment in Pakistan; this, in turn, has slowed down the pace of economic development. Using annual data for 1973–2006, the study concludes that foreign borrowing has had a negative influence on investment: foreign funds are not efficiently allocated due to poor governance, thereby affecting economic development. The authors suggest that the government should focus on proper planning and efficient implementation before inviting in foreign capital.

Ayyoub, Chaudhry, and Yaqub (2012) analyze the impact of external debt policy on the country's developing economy, using data for the period 1989/90 to 2009/10. The results put Pakistan in a bleak position: foreign money contributes the least to productivity, employment, and growth and development. That is, external debt liabilities have a negative impact on the pace of development.

Summing up, external debt servicing clearly has an adverse impact on overall government spending and social sector spending in particular. Another key conclusion is that the outstanding debt burden per se has only a minimal effect on social spending: it is the debt servicing liability that shifts public spending away from education and health.

3. Theoretical Background

Low-income developing countries thus face an expenditure–resource gap, with an investment–saving deficit and public sector budget deficit internally and a balance-of-trade deficit externally. Further, responsibility for accelerating the pace of development falls largely on the public sector, given that the private sector often lags behind and responds only to incentives from the government. As such, the latter has to rely on domestic and external borrowing, although it may of course receive some aid, grants, or assistance from donors on humanitarian grounds.

Foreign capital is beneficial in the short run if used carefully for growth and development and for institution building. It allows the government to finance its resource gaps and carry out development plans without affecting domestic investment. These projects, once complete, are expected to generate enough income to repay the country's debt and servicing liabilities.

However, if external resources are used to finance consumption expenditure (including military expenditures) or social sector projects that are (indirectly) productive only in the long run, or if such funds are misappropriated (via corruption or inefficient planning), then the stock of foreign debt becomes a deadweight. This is true of most HIPCs, where the practice of continuous borrowing translates over time into large stakes of outstanding debt and debt-servicing problems.

3.1. The Model

The analysis below is carried out in the form of three equations that are solved simultaneously.

3.1.1. Overall Government Spending

General expenditure (the annual budget) is determined by the availability of resources such as tax and nontax revenues, domestic borrowing, and foreign assistance. However, it also depends on foreign liabilities in terms of debt servicing, which in turn depends on the stock

of external debt. A number of other social factors and government preferences also come into play. Thus:

$$GEXP = f(GREV, PPED, DSER, FAID, SPOL) \quad (1)$$

where

- GEXP = overall government spending (net of debt servicing) as a percentage of GDP
- GREV = government revenues as a percentage of GDP
- PPED = public and publicly guaranteed external debt stock as a percentage of GDP
- DSER = debt servicing (external liability) as a percentage of GDP
- FAID = foreign aid and transfer receipts as a percentage of GDP
- SPOL = other sociopolitical factors that might affect government spending.

All these variables are purely "economic," barring SPOL, which is noneconomic and qualitative. We use the freedom index data provided by Freedom House as a proxy for the sociopolitical conditions of the countries concerned (see Section 4). The relationship between the explanatory variables and the dependent variable (GEXP) may be positive (as in the case of GREV and FAID) or negative (as in the case of PPED and DSER). SPOL may have a positive impact on government spending if political conditions are normal and conducive, and a negative impact otherwise.

The above function can be written in linear form as

$$GEXP_{it} = \alpha_0 + \alpha_1 GREV_{it} + \alpha_2 PPED_{it} + \alpha_3 DSER_{it} + \alpha_4 FAID_{it} + \alpha_5 SPOL_{it} + e_{it} \quad (1.1)$$

The subscript i stands for the ith country and t for the time (year). The error term e is expected to be normally and independently distributed with a zero mean and constant variance.

3.1.2. Development Expenditure

Development expenditure or the volume of the capital budget is assumed to depend positively on the size of the overall budget (GEXP), the availability of foreign financial assistance (FAID), and the country's stage of

economic development (represented by per capita GDP). The size of the budget deficit (DFCT) and the density of debt servicing (DSER) have to affect the development budget negatively. In addition, several other sociopolitical factors also affect the level of development expenditure. Thus:

$$DEXP = g\ (GEXP, GDPP, DFCT, FAID, DSER) \quad (2)$$

where DEXP is development expenditure as a percentage of GDP, GDPP is per capita GDP, and DFCT is the overall budget deficit as a percentage of GDP.

Again, the function can be expressed in linear form as

$$DEXP_{it} = \beta_0 + \beta_1 GEXP_{it} + \beta_2 GDPP_{it} + \beta_3 DFCT_{it} + \beta_4 FAID_{it} + \beta_5 DSER_{it} + e_{it} \quad (2.1)$$

3.1.3. Social Sector Spending

The volume of public spending in the social sector depends positively on the total budget, particularly on allocations for development (DEXP), the level of education (LIT), the level of health (LEP), and other sociopolitical factors (SPOL). DSER is most likely to affect allocations for social spending negatively. Specifically, its impact may be more severe on the social sector than on government spending in other sectors. To analyze this phenomenon, we construct the following equation:

$$SEXP = h\ (DEXP, DSER, LIT, LEP, SPOL) \quad (3)$$

SEXP is the share of the social sector in total government spending, LIT is the literacy rate as a proxy for education, and LEP is life expectancy at birth as a proxy for health.

The linear version of this function is:

$$SEXP_{it} = \delta_0 + \delta_1 DEXP_{it} + \delta_2 DSER_{it} + \delta_3 LIT_{it} + \delta_4 LEP_{it} + \delta_5 SPOL_{it} + e_{it} \quad (3.1)$$

3.2. Methodology

The different methodologies used to evaluate the impact of external debt burden and servicing on public expenditure, particularly social spending, include OLS, fixed and random effects, and indirect least squares. However, in this context, all these models are likely to face the

problem of endogeneity bias since total government expenditure and its different components are obviously correlated. The explanatory variables, such as debt servicing and the overall budget deficit, are also components of the total budget. As such, this makes OLS an inappropriate technique. The proposed structural model would face an identification problem while indirect least squares is also unsuitable.

The literature suggests alternatives such as the full information maximum likelihood method, three-stage least squares, and GMM. We have opted for the latter, keeping in view the strengths and limitations of the methodologies used in different studies. GMM is commonly used to estimate simultaneous equation models: it combines a first-difference equation and a level equation involving lags as instruments to deal with the problem of endogeneity and to obtain additional efficiency gains from exploiting extra moment restrictions. This provides an opportunity to evaluate the lagged impact of outstanding debt as discussed by Fan and Rao (2003).

3.3. Data Considerations

The data for the main explanatory variables—the stock of external debt (public and publicly guaranteed), debt servicing, overall government expenditure, development, social expenditure, government revenues, and foreign aid—are taken from the World Development Indicators database, and expressed as ratios to GDP.

As discussed above, the model includes social and political conditions (SPOL) as an important determinant of public expenditure. Although it is a qualitative variable, the freedom index serves as a useful proxy. Compiled by Freedom House (a US-based organization) on the basis of a worldwide annual survey, the index gauges countries' level of democratization and political stability.[5]

[5] See www.freedomhouse.org. The variables included in the survey are civil liberties, political rights, and individual freedoms. Political rights gauge citizens' free participation in the political process. Civil liberties measure individuals' rights to express their ideas, institutional rights, and personal sovereignty without the influence of the state. Political freedom is bifurcated into a civil liberties index and a political rights index, both measured on a scale of 1 to 7. The degree of political rights and civil liberties is reduced when the indices move up. The survey gives an opportunity to perform impulsively without interference from the government. It rates countries as free, partly free, or not free, depending on the scores assigned. Keeping in view these considerations, we have assigned a dummy of 1 if a country is rated "free" or "partly free" and 0 if it is rated "not free" in a certain year.

4. Model Estimation

We start by estimating the first equation, which appears to be free of endogeneity, by applying OLS. The results, given in Table 1, are somewhat comparable with those obtained using GMM.[6] Keeping in view the discussion above, we then apply GMM to the panel dataset for the seven countries. In this case, all three parts of the model are dealt with simultaneously, but the results for each are presented separately.

Table 1: OLS regression results for overall government expenditure

Dependent variable = government spending (ratio to GDP)

Variable	Coefficient	SE	t-statistic	Probability
CONS	1.26097	0.99681	1.26500	0.2075
GREV	1.26824**	0.05263	24.09514	0.0000
PPED	-0.00874	0.02328	-0.37548	0.7077
DSER	-0.75667**	0.15696	-4.82065	0.0000
FAID	0.21962**	0.08911	2.46473	0.0146
SPOL	0.74275	0.54513	1.36250	0.1747

R-squared (adj.)	0.740647
SE of regression	2.502974
Sum of squared residuals	1,133.943000
Log likelihood	-487.320800
F-statistic	18.624000
Prob. (F-statistic)	0.000000
Mean dependent variable	18.727800
SD dependent variable	4.914850
Akaike information criterion	4.823233
Schwarz criterion	5.383954
Hannan–Quinn criterion	5.049741
Durbin–Watson stat.	0.368893

Notes: Sample = 1980–2010. Periods included = 31. Cross-sections included = 7. Total number of panel observations = 217.
*, **, and *** indicate significance at 1%, 5%, and 10%, respectively.
Source: Authors' calculations.

The robustness of the GMM results depend critically on the validity of the instruments used in the estimation. Hansen's J-statistic is

[6] However, the results of the remaining two sub-models are not reported, being inappropriate.

widely applied for this purpose. The underlying null hypothesis in this case is that the instruments are uncorrelated with the residuals and are thus valid. The p-value associated with the J-statistic is 0.168977, which clearly indicates that the null hypothesis cannot be rejected. In other words, the instruments used are orthogonal to the residuals, implying that the estimation results presented in the following tables are robust.

4.1. Sub-Model 1: Overall Government Spending

The regression results for overall government expenditure based on equation (1.1) are given in Table 2. Overall public expenditure (net of debt servicing) is postulated to depend on total tax and nontax revenues, the availability of foreign assistance, the prevailing sociopolitical conditions, and the debt-servicing liability. Apart from SPOL, all the other variables are expressed as ratios to GDP.

4.1.1. Government Revenue (GREV)

As expected, government revenue has a positive impact on government expenditure (public consumption + investment) and the coefficient is significant at the 5 percent level. Government spending increases in response to a rise in revenues for most of the sample countries such that an increase of 1 percent in government revenue leads government spending to rise by 1.31 percent. This result is intuitive and consistent with theory as well as with the findings of Raju (2008).

4.1.2. Public and Publicly Guaranteed External Debt (PPED)

Public and publicly guaranteed external debt has a negative impact on government spending, indicating that the outstanding debt burden reduces overall government spending. Although the coefficient is significant at 5 percent, the variable's impact is relatively small: an increase of 1 percent in the stock of external public debt lowers overall government expenditure by merely 0.016 percent. This is intuitive: the stock of outstanding debt is less important than its cost (debt servicing), provided that the debt is sustainable. In other words, it is at the stage of repayment that the stock of debt becomes a serious matter.

Table 2: GMM regression results for overall government expenditure

Dependent variable = government spending (ratio to GDP)

Variable	Coefficient	SE	t-statistic	Probability
CONS	0.65670	0.91997	0.713830	0.4757
GREV	1.31472**	0.06602	19.914540	0.0000
PPED	-0.01669**	0.03652	0.457150	0.0648
DSER	-0.89552**	0.27545	-3.251140	0.0012
FAID	0.25641**	0.10539	2.432760	0.0154
SPOL	1.27985	0.80277	1.594276	0.1116

J-statistic	0.168977
R-squared (adj.)	0.734326
SE of regression	2.530305
Sum of squared residuals	1,171.647000
Mean dependent variable	18.799960
SD dependent variable	4.909057
Durbin–Watson stat.	0.359206

Note: *, **, and *** indicate significance at 1%, 5%, and 10%, respectively.
Source: Authors' calculations.

4.1.3. Debt Servicing (DSER)

Debt servicing (the payment of principal installments plus interest) is the most important variable in the model and has the expected negative sign with respect to government spending. The coefficient is significant at 5 percent, where an increase of 1 percent in debt servicing is likely to compel the government to cut its spending by 0.89 percent. The negative and significant relationship between debt servicing and government spending is supported by studies such as Baqir (2002) and Fosu (2010).

4.1.4. Foreign Aid (FAID)

Foreign aid has the expected positive relationship with overall government expenditure. This finding reflects the common wisdom: most of the sample's developing countries rely heavily on foreign assistance, particularly to support their development programs. The results show that an increase of 1 percent in foreign aid leads to a 0.25 percent increase in government spending, and the coefficient is significant at 5 percent. This is in line with Ouattara (2006) and Fosu (2010).

4.1.5. Sociopolitical Conditions (SPOL)

As mentioned earlier, we would expect overall government expenditure to be higher in relatively democratic developing countries compared to those with authoritarian systems. Although the results indicate a positive relationship between better sociopolitical conditions and government spending as expected, the coefficient is not significant. This implies that the role of democracy and sociopolitical conditions is not as important to public expenditure in Asian countries as expected.

4.2. Sub-Model 2: Development Spending

Based on equation (2.1), Table 3 gives the regression results for development expenditure in the public sector within the system. This is postulated to depend on the level of the overall budget, GDP per capita, the availability of foreign assistance, and the debt-servicing liability. With the exception of per capita GDP, all the other variables are expressed as ratios to GDP.

Table 3: GMM regression results for development expenditure in public sector

Dependent variable = development spending (ratio to GDP)

Variable	Coefficient	SE	t-statistic	Probability
CONS	8.12128**	2.49706	35.29000	0.0000
GEXP	0.49286**	0.22849	-2.15698	0.0316
GDPP	0.03669**	0.00552	6.64863	0.0000
DFCT	-0.32796	0.43744	-0.74972	0.4538
FAID	2.02406**	0.20868	9.69920	0.0000
DSER	-4.12013**	0.64712	-6.36684	0.0000

J-statistic	0.168977
R-squared (adj.)	0.187789
SE of regression	6.200459
Sum of squared residuals	5,420.843000
Mean dependent variable	92.450230
SD dependent variable	6.880018
Durbin–Watson stat.	0.596091

Note: *, **, and *** indicate significance at 1%, 5%, and 10%, respectively.
Source: Authors' calculations.

4.2.1. Overall Government Expenditure (GEXP)

The results reveal a positive relationship between overall government spending and the portion allocated to development spending. This finding conforms to the theory that an increase in government expenditure should also enhance the fraction allocated to development spending. The relevant coefficient is significant at 5 percent and shows that a 1 percent increase in overall government expenditure will raise development spending by 0.49 percent. However, the situation is not encouraging: an increase in government spending may be absorbed more than proportionately by debt servicing and other nondevelopment factors, and the share of the development budget may be smaller.

4.2.2. Per Capita GDP (GDPP)

Per capita GDP, which reflects the level of economic development and growth, has the expected positive sign with respect to development expenditure. The coefficient is significant at 5 percent and indicates that an increase of 1 dollar in per capita GDP will increase development spending by 0.036 percent. This finding is in line with Fan and Rao (2003).

4.2.3. Budget Deficit (DFCT)

The overall budget deficit appears to have a negative effect on development spending. In theory, the budget deficit is likely to depress both development and nondevelopment expenditures, but the negative impact on the former is likely to be higher for developing countries, which ultimately reduces their productivity. Our results confirm this expectation. An increase in the budget deficit of 1 percent diminishes development spending by 0.32 percent, and the coefficient is significant at 5 percent. Mahdavi (2004) reports a similar finding.

4.2.4. Foreign Economic Assistance (FAID)

Foreign aid has the expected positive impact on development spending for the panel of countries. The coefficient is significant at 5 percent and shows that a 1 percent increase in foreign aid will raise development spending by 2.02 percent. This means that the availability of foreign assistance is the strongest motive for carrying forward and completing development projects in these countries. Whether the aid is utilized optimally is a different issue. Ouattara (2006) also indicates a positive relationship between foreign aid and development expenditure, although the coefficient is not significant in this case.

4.2.5. Debt Servicing (DSER)

Debt servicing has the expected negative relationship with development spending. Intuitively, the greater the fraction of available resources taken up by debt servicing, the less there is to allocate to the development budget. Most previous studies support this finding. Our results indicate that a 1 percent increase in debt servicing pushes down development spending by 4.1 percent, at an acceptable significance level of 5 percent.

4.3. Sub-Model 3: Social Sector Spending

The regression results for social sector spending within the system as represented by equation (3.1) are given in Table 4. This variable should depend positively on the size of the development budget, the level of education denoted by the literacy rate (positive relationship), the level of health denoted by life expectancy at birth (positive relationship), the debt-servicing liability (negative relationship), and the level of sociopolitical development indicated by the freedom index (positive relationship). With the exception of life expectancy at birth, all other variables have the expected signs.

Table 4: GMM regression results for social expenditure in public sector

Dependent variable = spending on education and health (ratios to GDP)

Variable	Coefficient	SE	t-statistic	Probability
CONS	1.77136	1.78786	0.99077	0.3224
DEXP	0.07340**	0.02137	3.43497	0.0007
DSER	-0.25019**	0.09092	-2.75184	0.0062
LIT	0.06813**	0.01148	5.93167	0.0000
LEP	-0.14187**	0.03162	-4.48631	0.0000
SPOL	0.58819***	0.29542	1.99101	0.0471

J-statistic	0.168977
R-squared (adj.)	0.444518
SE of regression	0.808855
Sum of squared residuals	64.770340
Mean dependent variable	3.918753
SD dependent variable	0.672991
Durbin–Watson stat.	0.361525
Adj. R-squared	0.734000

Note: *, **, and *** indicate significance at 1%, 5%, and 10%, respectively.
Source: Authors' calculations.

4.3.1. Development Expenditure (DEXP)

The allocation to development expenditure is a key determinant of social spending because any increase in development spending will push forward social sector spending (education and health in particular). The results confirm this positive relationship. The coefficient is significant at 5 percent and its value indicates that a 1 percent increase in the development budget will increase social spending by 0.073 percent for the panel of countries.

4.3.2. Debt Servicing (DSER)

The results confirm a negative relationship between the dependent (social sector spending) and explanatory variables (size of debt servicing). As the literature shows, an increase in debt servicing shifts resources away from the social sectors, especially education and health. The coefficient is significant at 5 percent and the results indicate that a 1 percent increase in debt servicing will decrease social sector spending by 0.25 percent. The results are consistent with Fosu (2010), who finds that debt servicing has a negative impact on social spending in sub-Saharan Africa.

4.3.3. Literacy Rate (LIT)

The results show that a 1 percent increase in literacy raises social spending by 0.068 percent. Dauda (2010) has also used the literacy rate as a proxy for education and found a similarly significant and positive relationship between social spending and literacy growth.

4.3.4. Life Expectancy (LEP)

The life expectancy proxy for health yields a result contrary to the theory and common wisdom. The coefficient is significant at 5 percent, but has a negative sign. This indicates that a 1 percent increase in life expectancy will reduce government spending in the social sector by 0.14 percent. Dimou and Chletsos (2011), who use a similar proxy for health, find that most developing countries in their sample incur high expenditures on healthcare, but have not developed their domestic pharmaceutical production. Thus, in order to finance healthcare imports, these countries have to rely on foreign borrowing.

4.3.5. Sociopolitical Conditions (SPOL)

The results in this case indicate that sociopolitical development has a positive impact on social sector spending. The coefficient is significant at 10 percent and indicates that a 1 percent increase in sociopolitical stability will increase social spending by 0.58 percent. Thus, greater political stability and freedom of expression is associated with higher levels of social spending.

Based on the analysis above, the results obtained using GMM indicate that both the debt burden and debt servicing have a negative impact on overall government spending, development spending, and social spending (on education and health). A 1 percent increase in debt servicing is likely to compel the government to cut down its overall spending by 0.89 percent, its development spending by 4.1 percent, and its spending on the social sector by 0.25 percent. The results also suggest that GMM is best suited to analyzing the impact of debt servicing on public spending for panel data. All the results discussed above confirm the findings of previous studies carried out for other developing countries.

5. Conclusion and Policy Implications

The present study has attempted to explore the impact of external debt burdens on public spending in the social sector, particularly health and education. The model comprises a set of interlinked simultaneous equations (general government spending net of debt servicing, development spending, and social sector spending). The study uses data for 1980–2010 for a panel of seven developing Asian countries. The estimation is carried out within the GMM system framework. Besides other explanatory variables, each of the three equations includes debt servicing as an important determinant.

Our analysis confirms the general view in the literature that the debt-servicing liability has a negative impact on social sector spending, in this case, education and health. The higher the stock of external debt, the higher will be the debt-servicing liability. The case of external debt liability is, however, different from domestic public debt. External debt is serviced in terms of foreign exchange, which in turn has to be earned from exports or remittances. Further, the government has to cut down spending to release sufficient resources to this end. However, the (negative) distributional impact of this burden is heavy on the social sectors. Debt servicing reduces social sector spending in two ways: there

is a direct negative impact (-0.25, Table 4), and further through an indirect effect that takes place via the impact on development expenditures (-4.1*0.73, Table 3 & Table 4).

In addition to debt servicing and other important determinants of public spending (revenues, the budget deficit, GDP per capita, and the availability of foreign aid), we have also included measures of democratization (in terms of freedom of expression as a dummy variable), health (in terms of life expectancy at birth), and education (in terms of the literacy rate) as determinants of social sector spending. The results indicate that greater democratic rights and higher levels of literacy lead to more social spending. In other words, democratic governments are more inclined toward social sector spending than authoritarian governments.

On this basis, some policy implications are discussed below.

Social sector development is a primary area of importance from an economic and political point of view. Our results indicate that it is negatively affected by external debt liability. In order to minimize this impact, policy managers should ensure that the burden of debt servicing is distributed evenly among different sectors of the economy. This can be done by significantly reducing unwarranted current (nondevelopment) expenditure, particularly on public administration. Defense expenditure could also be reduced to some extent, depending on countries' national security considerations.

The policy managers of indebted countries must negotiate with donor agencies to obtain lower rates of interest and to relax the rules regarding loan purpose, duration, negotiation fee, and moratorium commitments. Such measures would provide some degree of relief in debt obligations.

Dependence on domestic borrowing, particularly circular debt, should be minimized, given that the servicing liability consumes a considerable fraction of the scarce resources collected through taxation.[7] Efforts should be made to enhance tax revenues to a level that is sufficient to finance current expenditure at the margin at least. This is essentially a function of efficiency in tax collection.

[7] Although the present study does not explicitly tackle this part of the debt issue, it is equally important and needs serious consideration.

External loans must be purpose-specific and allocated efficiently to productive ends and development projects. In particular, misallocation of these resources should be curtailed and foreign direct investment strategies adopted to boost infrastructure development.

The role of sociopolitical factors in economic development, as shown by the impact of democratization on social spending, implies that developing countries must strengthen their democracies and demonstrate good governance.

Finally, developing countries should mobilize their own resources and gradually reduce dependence on foreign assistance. This will help conserve scarce resources (foreign exchange earnings from exports and remittances), which can then be channeled into development purposes, capital formation, and increased productivity in the long run, enabling these economies to move onto a path of sustainable growth.

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Appendix

An Overview of Asian Developing Countries

Most developing countries have to rely on external resources, generally in the form of interest-bearing loans, foreign aid on easy terms, and sometimes donations. Such countries are in the initial phase of development and, therefore, need greater financial support. It is generally argued that the flow of resources from resource-surplus to resource-deficient countries enhances economic efficiency and welfare.

However, this is not true of developing countries facing large fiscal and trade deficits, many of which are hampered by lavish spending on nondevelopment projects, corruption and large governments. Likewise, they are bound to face a persistent deficit on the balance-of-payments current account. This practice not only increases the need for further borrowing, both internal and external, but also raises the proportion of current expenditure in the total budget due to debt servicing.

For many developing countries, the problem of debt accumulation started in 1973 with the tremendous increase in world petroleum prices. Developing non-OPEC countries were trapped in this price hike and their import bills for other manufactured goods also increased. Industrial countries found they could easily accommodate the oil price hike in exportable goods and shift the burden of inflation onto developing countries, which then had no option but to approach the IMF, World Bank, and other international agencies to meet their budgetary gaps and finance their imports. In many developing countries, the debt–GDP ratio is more than their GDP while debt servicing exceeds 25 percent of their export earnings.

Empirical analyses show that the ratio of debt to GDP and of debt servicing to GDP or export earnings can be meaningful in measuring the debt burden. If these ratios happen to be more than the critical values,[8] then the impact of the debt burden is negative on government spending and economic development.

There is a large variation among developing Asian countries when we compare these ratios. For instance, during the 1990s, the overall debt-to-GDP ratio was more than the critical value (> 50 percent) for Sri Lanka and Pakistan, but less for India (Global Development Finance, 2001). However, this trend has changed for some Asian countries over time. In

[8] According to the World Bank, the critical value of debt-to-GDP is 80 percent.

some cases, the debt situation has become critical and had negative effects on the economy (Siddiqui & Malik, 2001).

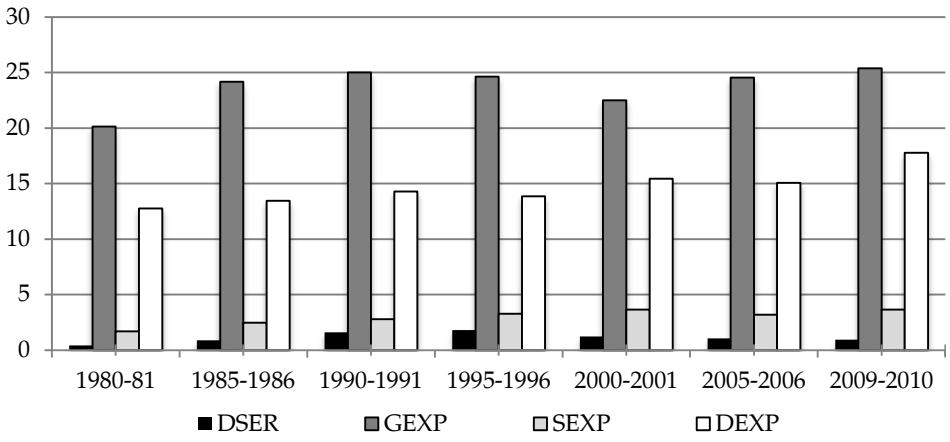
Relationship Between Debt Servicing and Economic Indicators

The debt-servicing-to-GDP ratio is an important indicator of debt sustainability because it shows how much of a country's GDP will be absorbed in servicing the debt burden. Economic theory suggests a negative relationship between debt servicing and development as well as social sector expenditure. We discuss this below in the context of the seven sample countries. All indicators are expressed as ratios to GDP.

Bangladesh

As Figure A1 shows, the external debt-servicing-to-GDP ratio for Bangladesh grew between 1980 and 1999, increasing from 0.42 percent in 1980 to 1.79 percent by the end of 1999. Thereafter, it declined, standing at 0.98 percent in 2009/10. This improved social sector spending from 1.6 percent in 1980 to 3.7 percent by the end of 2010.

Figure A1: Debt servicing and expenditure (current, development, and social) in Bangladesh

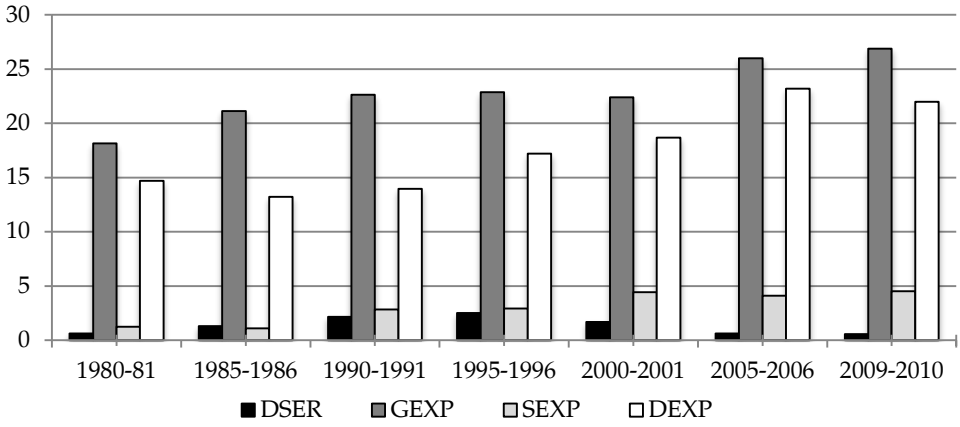


India

India is better off than other countries in South and Southeast Asia in terms of debt servicing. As the largest economy in the region, its debt servicing–GDP ratio looks to be very small, although the nominal value is not so low. Likewise, the country's pace of development and growth is relatively high.

Figure A2 shows that development spending improved 1991 onward, but social sector spending continued to diminish during this period. This declining trend is difficult to explain. However, as the debt-servicing ratio continued to increase from 0.61 percent in 1980 to 2.9 percent in 2003. Social sector spending roughly doubled in the span of 30 years, from 1.2 percent in 1980 to 4.5 percent of GDP in 2010.

Figure A2: Debt servicing and expenditure (current, development, and social) in India

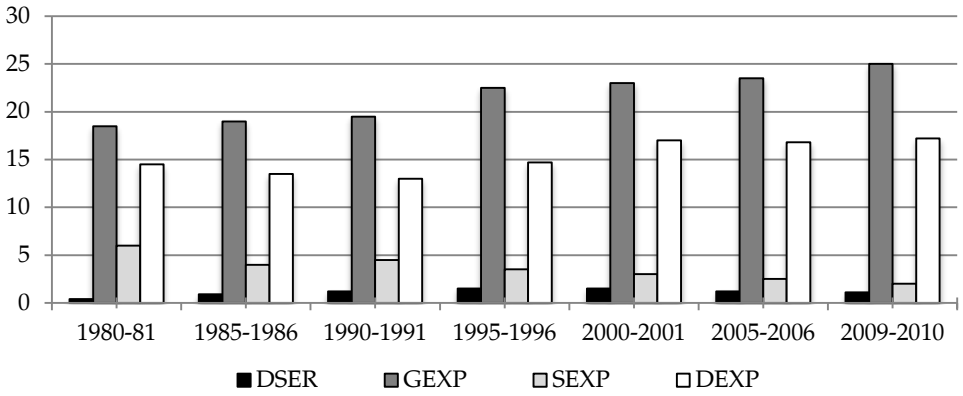


Pakistan

Pakistan has, unfortunately, suffered acutely from problems of terrorism and deteriorating law and order after 9/11, which has adversely affected its economic development and growth.

Figure A3 indicates that the debt servicing–GDP ratio continued to increase from 1980 to 1996, after which it declined, reaching 1.6 percent by the end of 2010. Social spending has an inverse relationship with debt servicing. It declined from 4.8 percent in 1980 to 2.2 percent in 1996, improved slightly in 1997, reaching 3.9 percent, but again falling to 2.8 percent in 2010. Although Pakistan received substantial funds from donor agencies in 2009/10, it could not mobilize these resources efficiently toward social sector and overall development due to poor governance and corruption. Public expenditure is extremely high in the current (nondevelopment) budget compared to social sector spending in health and education.

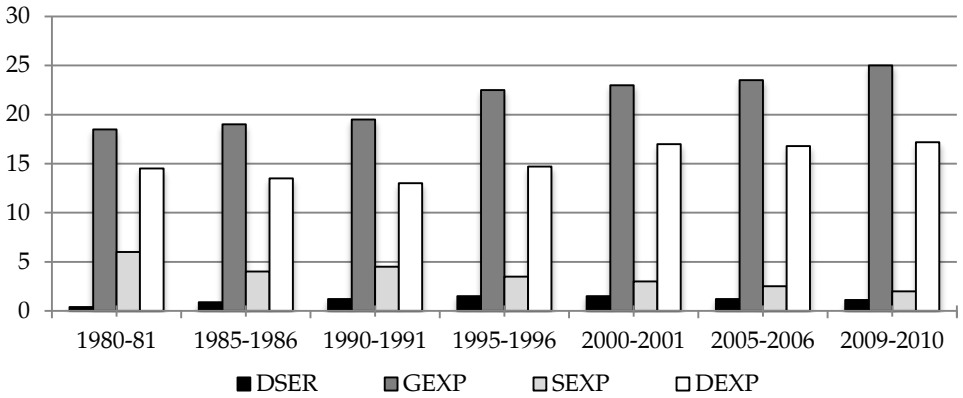
Figure A3: Debt servicing and expenditure (current, development, and social) in Pakistan



Nepal

Figure A4 illustrates debt servicing and current, development, and social expenditures in Nepal over the past 30 years. The debt servicing–GDP ratio gradually increased from 0.25 percent of GDP in 1980 to 1.3 percent by the end of 2010; social sector spending in the public sector fell continuously from 5.6 percent in 1980 to 1.9 percent by the end of 2010. This establishes the inverse relationship between debt servicing and social sector spending. Overall development spending, however, shows a declining trend from 1980 to 1990 and then a continuous increasing trend thereafter. Thus, the relationship between development spending and its component, social sector spending, is not clear in this case.

Figure A4: Debt servicing and expenditure (current, development, and social) in Nepal

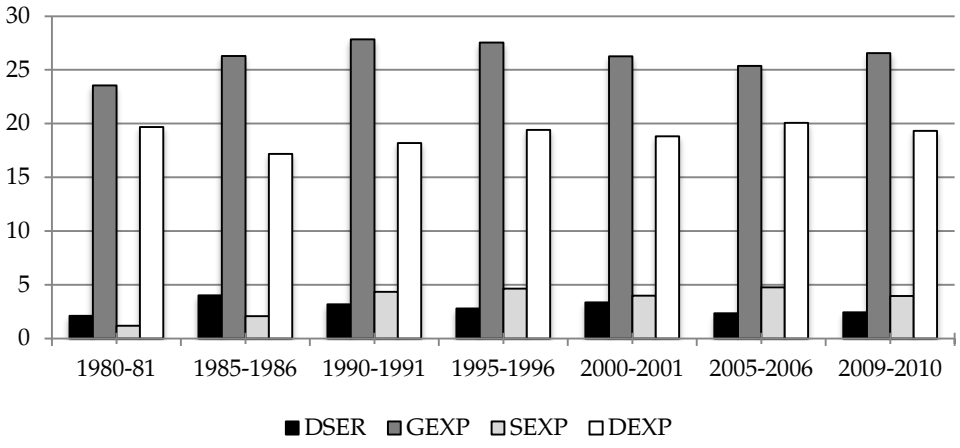


Sri Lanka

Sri Lanka remained in political turmoil during the 1980s and 1990s. Although its outstanding public external debt-to-GDP ratio is higher than that of the other countries under reference, as theory suggests, the stock of outstanding debt has had a minimal effect on social sector spending. In contrast, it is the cost of debt (servicing) that is important.

Figure A5 indicates that the debt servicing–GDP ratio followed an increasing trend from 1980 to 2001 (from 2.0 to 3.7 percent). However, it then declined to 2.3 percent by the end of 2010, indicating an improvement. Social sector spending, however, improved from 1.19 percent in 1980 to 4.7 percent in 2005. Declining somewhat in 2006, it then improved and stood at 3.9 percent of GDP at the end of 2010.

Figure A5: Debt servicing and expenditure (current, development, and social) in Sri Lanka

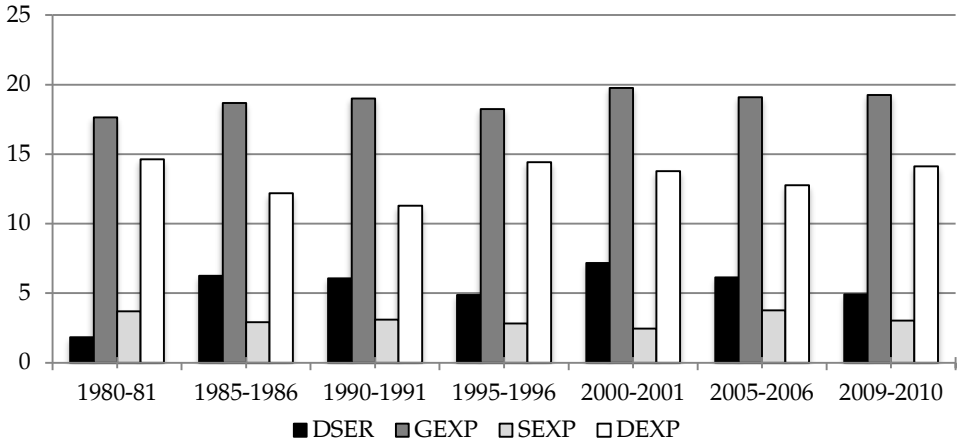


The Philippines

As Figure A6 shows, there is an almost inverse relationship between the debt servicing–GDP ratio and social sector spending in the Philippines over the 30-year period. The graph indicates fluctuations in debt servicing as well as current, development, and social spending. The debt servicing–GDP ratio continued to increase till 2001, i.e., from 1.8 percent in 1980 to 7.1 percent in 2001. Thereafter, the ratio gradually declined and stood at 4.9 percent of GDP at the end of 2010. Consequently, the social sector spending–GDP ratio also declined from

3.6 percent in 1980 to 2.4 percent in 2001, after which it increased, standing at 3.0 percent of GDP by the end of 2010.

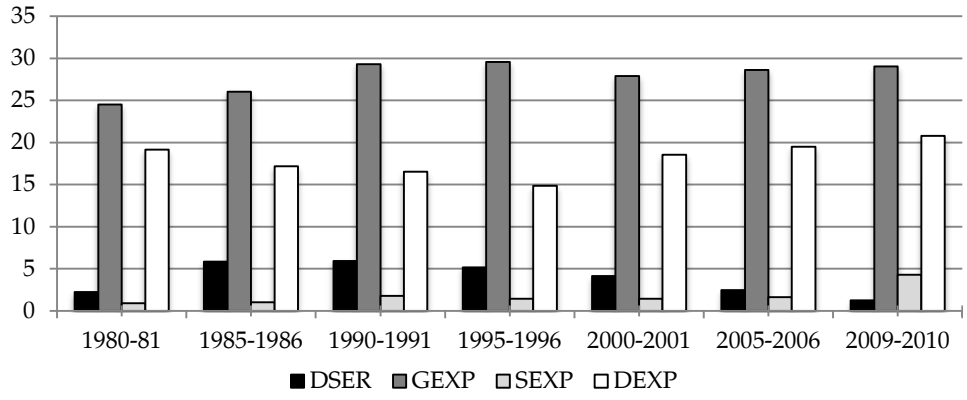
Figure A6: Debt servicing and expenditure (current, development, and social) in the Philippines



Indonesia

Figure A7 indicates that Indonesia's debt-servicing ratio rose from 2.2 percent of GDP in 1980 to 6.6 percent in 1999. After 2001, the debt-servicing ratio started to decline and stood at 1.25 percent of GDP in 2010. This, in turn, improved social sector spending from 0.51 percent in 1980 to 4.2 percent in 2010.

Figure A7: Debt servicing and expenditure (current, development, and social) in Indonesia



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Relative Factor Abundance and Relative Factor Price Equality in Punjab

Resham Naveed[*]

Abstract

This study tests the relative factor price equality across districts in Punjab using the methodology developed by Bernard, Redding, and Schott (2009) and data from the Census of Manufacturing Industries for 2000/01 and 2005/06. The results indicate the absence of relative factor price equalization due to the uneven distribution of factors in the province. Nonproduction (white-collar) workers) are relatively scarce in Punjab, which results in a wage premium for this type of labor. The study adjusts for worker quality by using a Mincerian wage equation as worker quality could explain the wage differential between white-collar and blue-collar workers. However, this exercise yields similar results, implying that factors are distributed unevenly across the districts of Punjab even after controlling for worker quality differences.

Keywords: Sector price, wages, equality, Punjab, Pakistan.

JEL classification: E24.

1. Introduction

Factor price equalization (FPE) is a central result of international trade theory. The Heckscher–Ohlin–Samuelson (HOS) theorem illustrates that trade in goods will lead to the equalization of factor prices across countries. In the absence of international trade, countries are bound to use the scarce factor in the production of goods and this receives a relatively high return. In international trade, however, countries will focus on goods that are intensive in the abundant factor and import goods that are intensive in the scarce factor; this results in the equalization of factor prices because the scarce factor is now available as an imported good.

Given that factors of production are embodied in goods, the movement of goods will lead to FPE. FPE is an important determinant of workers' receptiveness to international trade and patterns of labor mobility across regions. The geographic concentration of inputs then governs the

[*] Teaching Fellow, Lahore School of Economics.

pattern of distribution of investments in terms of setting up industries across the world.

FPE is more likely to occur within a region or country because its two major determinants, factor mobility and goods mobility, are higher within a country than at a cross-country level. The question of FPE is also relevant at a regional level where it may determine government policies for national development plans. Moreover, variation in factor prices in a country leads to the movement of labor and industries to regions with higher incentives. Industry location is determined by factor prices because regions endowed with an abundant factor will have more industries that use that factor intensively.

Using the methodology developed by Bernard, Redding, and Schott (2009), this study investigates whether relative factor prices equalize across Punjab, Pakistan. Given that firm-level studies on Pakistan have received limited attention, this paper contributes to the literature by testing for relative factor price equality (RFPE) applied to a unique dataset. It would be interesting to see if the results of this analysis are in congruence with what the literature has already established. Pakistan is a developing country and it is inherently different from all the countries for which Bernard et al. (2009), among others, have tested for relative price equality.

The test is based on the "lens condition" developed by Deardorff (1994). The technique applied by Bernard et al. (2009) is used to check for the existence of factor lumpiness by testing to see if the relative wage bill for production to nonproduction workers equalizes across Punjab. Production or "blue-collar" workers are directly involved in producing goods, whereas nonproduction or "white-collar" workers are not involved directly in production.

RFPE is different from absolute factor price equalization (AFPE), for which the return on similar factors should equalize, for instance, the wages of nonproduction workers across regions. RFPE requires that relative factor prices should equalize rather than absolute factor prices, for instance, the relative wages of nonproduction to production workers across countries. RFPE allows us to control for interregional productivity differences because regions with higher productivity will pay more to both types of workers while the relative wage remains the same.

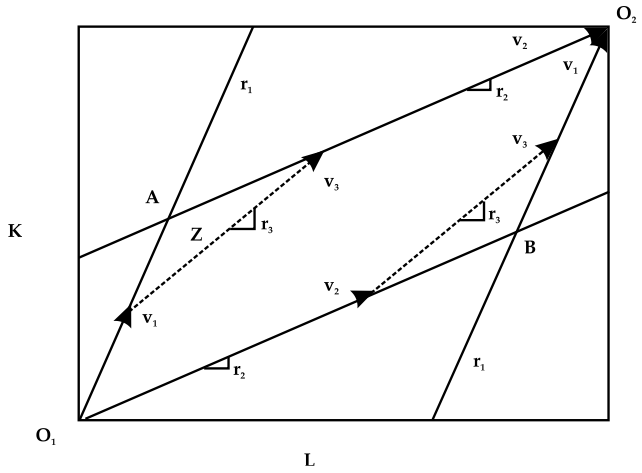
2. Literature Review

The literature review examines the lens condition, tests for AFPE, and tests for RFPE.

2.1. The Lens Condition

Deardorff (1994) developed the lens condition to test FPE, using the concept of an integrated world economy (IWE) introduced by Dixit and Norman (1980). In an IWE, factors and goods across the world have perfect mobility and equilibrium is achieved under one set of equilibrium prices of goods and factors, techniques of production, and equilibrium quantities of goods demanded. Dixit and Norman argue that FPE is possible if, in the absence of factor mobility, it is possible to distribute factors in a country using certain techniques of production to replicate the outputs produced under the IWE. If this is not possible, then FPE is violated. Deardorff has formulated a visual representation of FPE, given below in Figure 1.

Figure 1: FPE with two and three goods and two countries

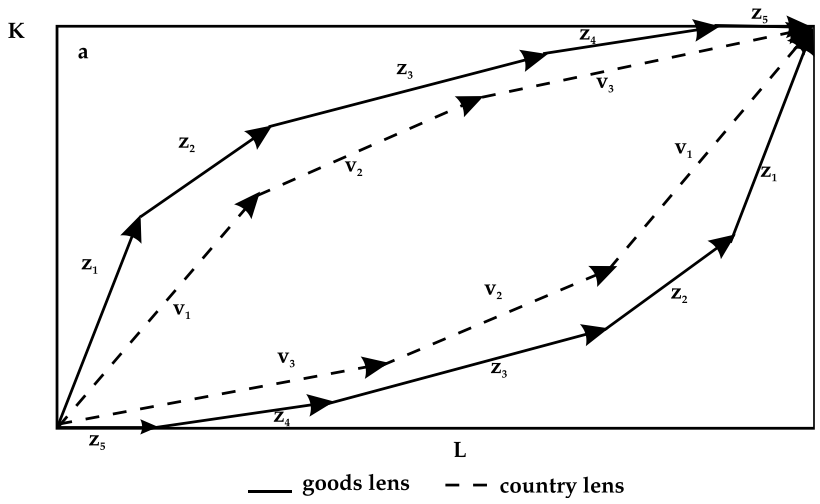


The axes K and L represent the world factor endowment for capital and labor, respectively. O_1 is the origin for measuring factor endowment in country 1 and O_2 is the origin for measuring factor endowment in country 2. The lines originating from O_2 and O_1 have slopes equal to the ratio of both factors employed in industries. For FPE to occur, endowments must lie in the parallelogram O_1AO_2B. Let x_i (where i = 1, 2, 3…) be the quantity of goods produced under IWE. Vectors v_1, v_2, and v_3 represent the factors required to produce IWE quantities. These vectors outline the hexagonal area $O_1v_1v_3O_2v_3v_2$, which is the only portion of the box in which FPE can occur.

The lens condition requires the variation in factor endowments across regions to be less than the variation in factor intensities across regions. To determine if the lens condition is met, the two-goods technique above can be modified for multiple goods. Factor endowments across regions are plotted first in decreasing order and then in increasing order of capital intensities. The two paths form a polyhedral lens, illustrated in Figure 2. The lens formed by plotting factor intensities is called a "country lens."

Following the same approach, factor use across sectors is plotted in decreasing and then increasing order of capital intensities. The resulting lens is the "goods lens." FPE is possible only when the country lens lies inside the goods lens. In other words, for FPE to hold, the factor endowment lens must be a subset of the factor use lens, and factor endowments across regions should vary less than factor intensities across goods.

Figure 2: Goods lens and country lens



Cunat (2001) empirically tests for FPE across a sample of 114 countries by constructing a single-lens condition (which relates factor intensity in goods production to countries' factor endowments) for the entire world. He concludes that international trade cannot equalize FPE, but that FPE may be possible in certain regions. One concern regarding this methodology is that only two factor endowments (capital and labor) are analyzed when checking for FPE. In other words, there may be a multiple-factor case in which FPE holds. Debaere and Demiroglu (2003) examine the distribution of factor endowments using the lens condition throughout the world. Their results indicate that the condition is violated for the entire world as a whole, except for certain rich OECD countries.

Under the HOS theorem, trade is determined by relative factor endowments and countries will export commodities that are rich in their abundant factors. Courant and Deardorff (1992) explain that regional factor endowments are also a driver of international trade. They show theoretically that an uneven regional factor distribution can result in international trade. For instance, in the case of a change in relative factor prices, a country with a lumpier distribution of factors can easily export the factor compared to a country with a relatively even distribution of that factor. If the factors of production are not distributed evenly in a country (lumpiness), then different regions within that country will specialize in the production of various goods. As a result, a lumpy country may have a larger mix of commodities that are produced and offer a variety of exports. This implies that not only international but also intra-national factor endowment differences can facilitate international trade.

Debaere (2004) checks for lumpiness in the UK, Japan, and India using the lens condition. The results show that the condition is not violated in all three countries and FPE holds in all three cases. This indicates that the empirical evidence does not support the argument concerning a lumpy distribution of factors of production in these countries.

2.2. Absolute Factor Price Equality

Tests for AFPE focus on the equalization of returns to similar factors across regions. Trefler (1993) reinforces the concept first presented by Leontief (also known as the Leontief–Trefler hypothesis) that FPE is possible when factors are adjusted for productivity differences, such as labor, which is known to exhibit significant cross-country productivity differentials. The results indicate that cross-country variations in factor prices are explained by the productivity differences in those factors. For instance, if wages in the UK are two thirds of the wages in the US, this would be because British workers are less productive than American workers by the same magnitude.

Davis and Weinstein (2001) empirically test the HOS theorem, based on the factor content of trade. Leontief (1953) found that US exports were relatively more labor-abundant than US imports. This contradicted the theory because the US was found to be labor-scarce at that time. Repetto and Ventura (1997) test the modified version of AFPE given by Trefler for a sample of all possible countries at different time intervals.[1] The

[1] 1970, 1975, 1980, and 1985.

Leontief–Trefler hypothesis suggests that the difference in factor prices across countries is due to difference in the productivity of factors (see also Treffler, 1993). Their panel regression analysis indicates that the Leontief–Trefler hypothesis is not valid.

Burgman and Geppert (1993) suggest that the failure of AFPE may be because factor prices are nonstationary. Berger and Westermann (2001), however, argue that this result suffers from finite sample bias and that the data used for wages is nominal rather than real.

Studies based on cross-country analyses of AFPE and the lens condition indicate that factor prices do not equalize. There may be multiple regions in which AFPE holds, implying there may also be multiple cones of diversification (Cunat, 2001; Debaere & Demiroglu, 2003). The evidence also suggests that factors inhibiting the free movement of trade might explain FPE failure, given that wages seem to be linked at a bilateral level (Burgman & Geppert, 1993).

2.3. Relative Factor Price Equality

The problem inherent in testing for AFPE is that it does not account for productivity differences across regions, although it may be that the differential in factor prices between regions is due to such productivity differences. Testing for RFPE eliminates this problem: when the relative wage bill is calculated, the productivity difference between regions is canceled out. Thus, the focus of the literature has changed from testing AFPE to RFPE.

Given that unobserved differences in factor quality can cause problems when testing for FPE, Bernard et al. (2009) use a different methodology to control for these differences. Any given sector will employ different types of labor and their respective shares of employment will be determined by their relative wages. The authors test RFPE instead of FPE for 181 labor market regions across the US for 1972 and 1992. Relative price equalization means that relative factor prices should be identical for factor inputs. The methodology includes running a regression of the relative wage bill for nonproduction and production labor for two regions on a set of regional dummies. The significance of these dummies would indicate that RFPE was rejected. The test is done under the assumption of constant returns to scale and Hicks-neutral technology differences.

The study's results indicate that the data do not exhibit RFPE and that there is a significant variation in real wages across regions; for some regions, the wage gap has increased over time. Additionally, the wide movement of all categories of labor across regions of the US indicates the integration of labor markets. Bernard et al. (2009) conclude that regional variations in factor endowments, the use of different production technologies in various regions, and increasing returns to scale might potentially explain why RFPE fails to hold.

Hanson and Slaughter (2002) obtain different results for AFPE in the US. Using a different methodology from Bernard et al. (2009), they test for the equalization of production techniques to determine if FPE holds. Their analysis indicates that AFPE does hold for the US, given the similarity of production techniques.

Bernard, Redding, Schott, and Simpson (2002) conduct a similar analysis testing for RFPE in the UK. They also report the absence of RFPE, finding that there is significant variation in real wages across the UK. Bernard, Robertson, and Schott (2010) use the lens condition to check for lumpiness in Mexico; they find that factors are unevenly distributed, as a result of which relative wages fail to equalize across Mexican regions.

Tomiura (2005) tests for AFPE and RFPE in Japan, following the methodology used by Bernard et al. (2009). The RFPE hypothesis is rejected for most regions in the country and the results are robust to differences in unobserved productivity. An additional test to determine the convergence of wages indicates that they have moved closer over the last decade, but the cross-region wage gap is still very high.

The literature on regional factor price convergence suggests that the distribution of factors even within countries is uneven and is one of the reasons that FPE fails at the regional level. This, in turn, implies that it may not be possible for factor prices to equalize at the international level.[2] However, while the literature has shown that FPE can be violated, there is little explanation of the factors contributing to its failure. Most regional and cross-country studies reinforce the idea that FPE is not possible. The missing element is the extent to which the regional uneven distribution of factors contributes to factor price inequality

[2] This is in line with the results of the cross-country analysis.

3. Methodology and Estimation Strategy

As far as relative wages and production structure are concerned, the empirical approach developed by Bernard et al. (2010) will be used to test for RFPE. This approach has significant advantages: it accounts for differences in unobserved factor quality and can be applied to economies with variations in prices and market structure.

Generating the wage bill allows us to control for unobserved factor quality. The relative wage bill in region *r* is normalized by the relative wage bill in region *s*.

RFPE is tested using the following econometric specification:

$$Ln\left[\frac{RW_{rj}}{RW_{sj}}\right] = \sum_r \alpha_r{}^s\, d_r + \varepsilon_{\mathrm{rsj}} \qquad (1)$$

where RW = W^N/W^P, d_r is a set of regional dummies, and ε_{rsj} is a stochastic term. If the set of regional dummies is jointly insignificant, then the null hypothesis of RFPE is not rejected.

First, we test for RFPE across the districts of Punjab by applying equation (1) to data on the wage bills for production and nonproduction workers taken from the Census of Manufacturing Industries (CMI) for 2000/01 and 2005/06.

Next, we ask whether differences in worker quality might drive the results obtained. Using a Mincerian wage regression, we adopt the methodology developed by Bernard et al. (2010), who argue that differences in the quality of workers may explain the variation in factor prices. It is very likely that workers are relatively more educated in one region, which enables them to earn a higher wage.

The objective is to establish a relationship between factor endowments and factor prices after removing the effects of worker quality. If factors are indeed lumpy, there should be an inverse relationship between relative wages and relative endowments across regions. In regions with a large endowment of a particular factor, the factor's price will be low. To ensure that differences in worker quality are not driving these results, we derive wage quantities of workers adjusted for observed quality, and test for this inverse relationship following Bernard et al. (2010).

Mincer's (1958) human capital earnings function, where education is identified as a major determinant of a worker's wage growth, is estimated to correct for worker quality. The objective is to calculate the quality-adjusted relative wage and relative employment for every region. This is done by estimating the following model:

$$\ln w_i = \alpha + \beta_1 \, education + \beta_2 \, sex + \beta_3 \, age + \varepsilon_i \qquad (2)$$

The equation above is a simple Mincerian equation where the wage of a worker is a function of his or her schooling, in order to incorporate the human capital effect. Better-educated workers will have more human capital and thus earn more. *Age* is an indicator of experience and will also positively affect wages, while *sex* captures the effect of gender on earnings. All three factors jointly determine the effect of worker quality on wages. α is a constant term that determines the wage independently of the effect of other explanatory variables, that is, the human capital effect (observed quality).[3]

Bernard et al. (2010) estimate a Mincerian wage regression separately for production and nonproduction workers, for each state and industry. Then, for each industry and state, the estimated constant term (α) for nonproduction workers is divided by the estimated constant term (α) for production workers. We estimate the Mincerian wage equation based on data from the Pakistan Social and Living Standards Measurement Survey (PSLMS) for 2008/09 for Punjab.

The ratio $\frac{\alpha_{ij}{}^{N}}{\alpha_{ij}{}^{P}}$ represents the relative wage bill (adjusted for observed quality) of nonproduction workers to production workers in state i and industry j. To determine the employment level adjusted for observed quality, we calculate the following ratio for each occupation h, industry j, and state i:

$$\left(\frac{w'}{\alpha}\right)_{hij}$$

The quantity of quality-adjusted nonproduction workers is calculated as the sum of this ratio across all states and industries for nonproduction workers. The same is done for production workers and the ratio of the two quality-adjusted quantities is then taken for each state and industry.

[3] α represents the wage after the effect of human capital is removed.

As mentioned above, an uneven distribution of factors will lead to a difference in factor prices, such that there is an inverse relationship between the relative quantity of a factor and relative factor price. This implies that the abundant factor will earn a lower return than the scarce factor. Using the quality-adjusted figures for wages and number of workers, the wage ratio is regressed on the ratio of nonproduction to production workers (controlling for industry-specific effects) to check for an inverse relationship between observed quality-adjusted wages and levels of employment.

$$\frac{\alpha_{ij}{}^{N}}{\alpha_{ij}{}^{P}} = \alpha + \beta \left(\frac{w'}{\alpha}\right)_{hij} + \sum_j \gamma_j d_j + \varepsilon \quad (3)$$

where d_j refers to a set of industry dummies and ε is an error term.

4. Data

Administered by the Pakistan Bureau of Statistics in collaboration with the provincial bureaus of statistics, the CMI provides basic data on manufacturing firms in Pakistan in terms of employment and wages, assets, stocks, output value, industrial taxes, production costs, and the value of raw and intermediate inputs. It covers manufacturing establishments registered under the Factories Act 1934, and includes all sectors of manufacturing from food processing to steel industries. The CMI for 2005/06 covers over 3,500 manufacturing firms while the CMI for 2000/01 covers about 2,300 manufacturing firms. We use data from the CMI to construct a relative wage bill for production to nonproduction workers in various regions.

Data from the Pakistan Social and Living Standards Measurement Survey (PSLMS) for 2008/09 are used to estimate the worker quality-adjusted model. The PSLMS is a household survey conducted by the Pakistan Bureau of Statistics that provides a set of district-level, population-based estimates of social indicators. Covering approximately 75,188 households, the survey includes indicators for education, health, water supply and sanitation, and households' economic situation.

There is a strong possibility that our analysis of these two datasets will yield different results, which will need to be carefully compared. The main difference is their coverage: the CMI is restricted to Punjab whereas the PSLMS covers all of Pakistan. Although restricting the PSLMS analysis to Punjab would help resolve the problem, the unit of analysis remains different: the CMI is a firm-level dataset and the PSLMS is a household-level dataset.

It could also be argued that the results of both analyses will be different because the wages estimated from the two datasets cannot be directly compared, given the different units of analysis. However, the equations being estimated are also different from each other. Equation (1) tests for FPE using industry- and district-specific wages whereas district-level wages are used in the worker quality model. Even if the unit of analysis is different, the occupations are the same and the wages are estimated at an individual level to ensure that the difference in wages remains largely similar.

Table 1 gives the distribution of employment and industries across districts. The number of industries has increased over time, but the employment share of each district remains more or less consistent. In the absence of any drastic changes in the district data, there should not be much variation in the results obtained from the CMI 2000/01 and 2005/06.

There are some data limitations to consider. The response rate for the CMI is low, so it is possible that many production labor-intensive firms are not being accounted for. The response rate for the 2000/01 census was around 60 percent while that for 2005/06 was around 49 percent.

Table 1: Distribution of employment and industries, by district

	Share of manufacturing employment		Number of industries in each district	
District	**2000/01**	**2005/06**	**2000/01**	**2005/06**
Attock	0.027	0.010	8	7
Bahawalnagar	0.010	0.010	6	5
Bahawalpur	0.014	0.010	13	8
Bhakkar	0.017	0.016	2	7
Chakwal	0.029	0.007	4	6
Dera Ghazi Khan	0.021	0.008	7	6
Faisalabad	0.100	0.059	36	32
Gujranwala	0.040	0.037	64	59
Gujrat	0.048	0.042	12	19
Hafizabad	0.031	0.045	6	9
Jhang	0.031	0.009	19	6
Jhelum	0.021	0.019	10	6
Kasur	0.056	0.108	27	29
Khanewal	0.019	0.058	11	12
Khushab	0.036	0.042	7	12
Lahore	0.136	0.107	112	86
Layyah	0.004	0.008	3	3
Lodhran	0.001	0.000	4	17
Mandi Bahauddin	0.014	0.013	3	5
Mianwali	0.017	0.014	4	5
Multan	0.047	0.021	34	25
Muzaffargarh	0.044	0.064	6	10
Nankana Sahib	-	0.017	-	7
Narowal	0.001	0.001	2	3
Okara	0.012	0.015	13	14
Pakpattan	0.006	0.005	4	4
Rahimyar Khan	0.033	0.022	10	9
Rajanpur	0.000	0.006	1	3
Rawalpindi	0.036	0.068	30	18
Sahiwal	0.011	0.010	17	5
Sargodha	0.015	0.013	14	14
Sheikhupura	0.092	0.075	67	49
Sialkot	0.010	0.009	23	26
Toba Tek Singh	0.015	0.019	10	11
Vehari	0.005	0.033	3	3

Source: Author's calculations.

The definition of nonproduction and production workers may also be problematic. The CMI includes some occupation, such as cleaning staff, in the nonproduction worker category, even though they do not qualify as white-collar workers. This could affect the results because the relative wage of nonproduction to production workers will be distorted downward by nonproduction workers who are not white-collar workers.

5. Empirical Results

It is important to mention at the outset that the base region *s* is identified as all of Punjab. The CMI clearly differentiates between production and nonproduction workers, and gives information on the number of both types of workers and their wages. The wage bill for every firm is calculated by simply multiplying the number of workers and their respective wages (see Section 3). For the base region's relative wage in an industry, the wage bill for one type of worker is calculated by summing all the wage bills for that type of worker in that industry for Punjab overall.

The ratio of relative wage bills is calculated by dividing the summed wage bills for both types of workers in that industry for Punjab. It is important to note that this is industry-specific. For instance, if we calculate the relative wage bill for industry 1 and district 1, the numerator will simply be the relative wage bill for firms in industry 1 in district 1, but the base will be the ratio of the summed wage bills for industry 1 for the whole of Punjab (except district 1). In the final calculation of the relative wage bill, every observation is subtracted from the base to remove its individual effect, that is, the relative wage bill for district 1 and industry 1 is subtracted from the final relative wage bill for industry 1 in Punjab.

5.1. Regression Results for RFPE

Following the methodology developed by Bernard et al. (2009) for RFPE, the relative wage bill is regressed on a set of district dummies to check for the presence of RFPE (Table 2).

Table 2: Regression results for RFPE

Variable (district)	2000/01	2005/06
	$Ln\left[\frac{RW_{rj}}{RW_{sj}}\right]$	$Ln\left[\frac{RW_{rj}}{RW_{sj}}\right]$
Attock	1.214*	0.723
	0.674	1.070
Bahawalnagar	0.989	0.548
	0.870	1.070
Bahawalpur	0.639	-0.033
	0.569	0.757
Bhakkar	-0.184	0.503
	1.506	0.677
Chakwal	1.102	0.600
	1.506	0.874
Dera Ghazi Khan	2.529***	0.581
	0.870	1.070
Faisalabad	0.910**	0.913**
	0.389	0.404
Gujranwala	0.331	0.518*
	0.346	0.281
Gujrat	1.094*	0.750*
	0.615	0.437
Hafizabad	0.344	0.162
	0.870	0.757
Jhang	-0.490	0.185
	0.533	0.677
Jhelum	-0.670	1.266
	0.569	0.757
Kasur	0.634*	0.590
	0.389	0.378
Khanewal	0.404	0.427
	0.674	0.535
Khushab	0.222	-0.377
	0.753	0.677
Lahore	0.874***	0.918***
	0.225	0.242
Layyah	0.976	-
	1.065	
Lodhran	-0.720	0.893
	1.065	1.070

Variable (district)	2000/01	2005/06
	$Ln\left[\frac{RW_{rj}}{RW_{sj}}\right]$	$Ln\left[\frac{RW_{rj}}{RW_{sj}}\right]$
Mandi Bahauddin	0.063	0.579
	1.065	0.757
Mianwali	0.171	0.616
	0.870	0.757
Multan	0.089	0.598
	0.377	0.404
Muzaffargarh	-0.309	0.385
	0.870	0.618
Nankana Sahib	-	0.988
		0.677
Narowal	-	-2.445*
		1.513
Okara	0.518	-0.418
	0.533	0.535
Pakpattan	0.231	1.153
	1.065	1.070
Rahimyar Khan	0.874	0.800
	0.674	0.757
Rajanpur	1.143	-5.016***
	1.506	1.513
Rawalpindi	0.474	0.900*
	0.377	0.504
Sahiwal	0.668	-0.406
	0.476	0.437
Sargodha	0.896*	0.828*
	0.476	0.504
Sheikhupura	0.699***	0.695**
	0.266	0.291
Sialkot	0.566	-0.119
	0.476	0.391
Toba Tek Singh	0.618	-0.696
	0.569	0.618
Vehari	-	0.639
		0.874
Observations	276	286
R-squared	0.2139	0.2147
Joint P-value	0.0011	0.0012

Source: Author's calculations.

The first important result is that all the district dummies are jointly significant for both years. This implies that we can reject the null hypothesis of full RFPE, that is, factor price inequality exists in Punjab for both years. However, the individual coefficients provide a somewhat different picture: relatively few districts have statistically significant coefficients. The individual coefficients represent how the relative wage in a district for an industry is different from the average relative wage in Punjab for the same industry. The wage is converted to logarithmic form to smooth out variations.

Second, most districts have a positive coefficient, which implies that the wage bill for a nonproduction worker in the district is greater than the wage bill for a nonproduction worker in the base region. Thus, a coefficient of 1.094 for Gujrat can be interpreted to mean that the relative wage in Gujrat is significantly 109.4 percent higher than the relative wage in Punjab overall.

Under the HOS theorem, a premium is offered to whichever type of labor is relatively scarce: if a region has abundant nonproduction labor, the latter will be offered lower wages. The excess supply of production labor in Pakistan leads to higher wages for nonproduction labor in most districts. For 2000/01, Sheikhupura and Lahore are the two districts that are significant at the 5 percent level. For Lahore, the wage bill for nonproduction workers is significantly 87 percent higher than that for nonproduction workers in the rest of Punjab; for Sheikhupura, the relative wage bill is significantly 69 percent higher than for the base region.

Table 3 gives the ratio of nonproduction to production workers for each district in the CMI 2000/01 and 2005/06. Table 4 shows the percentage distribution of labor in industries intensive in white-collar (nonproduction) workers and those intensive in blue-collar (production) workers. Both tables show the district-wise distribution of the endowments of both factors of production.

Table 3: Ratio of nonproduction to production workers, by district

District	2000/01	2005/06
Attock	0.238	0.439
Bahawalnagar	0.406	0.346
Bahawalpur	0.460	0.105
Bhakkar	0.377	0.299
Chakwal	0.074	0.529
Dera Ghazi Khan	0.589	0.113
Faisalabad	0.239	0.399
Gujranwala	0.341	0.386
Gujrat	0.119	0.170
Hafizabad	0.389	0.356
Jhang	0.219	0.483
Jhelum	0.121	0.282
Kasur	0.296	0.211
Khanewal	0.237	0.435
Khushab	0.270	0.306
Lahore	0.285	0.271
Layyah	1.449	0.422
Lodhran	0.292	0.537
Mandi Bahauddin	0.222	0.087
Mianwali	0.274	0.433
Multan	0.188	0.162
Muzaffargarh	0.127	0.109
Nankana Sahib	-	0.205
Narowal	1.054	1.104
Okara	0.519	0.310
Pakpattan	0.500	0.342
Rahimyar Khan	0.504	0.441
Rajanpur	0.400	0.476
Rawalpindi	0.232	0.232
Sahiwal	0.252	0.076
Sargodha	0.295	0.495
Sheikhupura	0.240	0.271
Sialkot	0.464	0.148
Toba Tek Singh	0.418	0.721
Vehari	0.394	0.100

Source: Author's calculations

Table 4: Distribution of manufacturing employment across industries

District	2000/01		2005/06	
	% of manufacturing employment in…			
	Production labor-intensive industries	Nonprod. labor-intensive industries	Production labor-intensive industries	Nonprod. labor-intensive industries
Attock	82.99	17.01	73.24	26.76
Bahawalnagar	38.35	61.65	100.00	0.00
Bahawalpur	17.40	82.60	29.62	70.38
Bhakkar	56.10	43.90	56.45	43.55
Chakwal	100.00	0.00	99.13	0.87
Dera Ghazi Khan	95.32	4.68	91.05	8.95
Faisalabad	91.86	8.14	93.92	6.08
Gujranwala	77.40	22.60	78.62	21.38
Gujrat	99.47	0.53	97.31	2.69
Hafizabad	80.55	19.45	93.68	6.32
Jhang	57.73	42.27	36.94	63.06
Jhelum	96.19	3.81	95.35	4.65
Kasur	96.01	3.99	94.66	5.34
Khanewal	68.96	31.04	85.58	14.42
Khushab	84.60	15.40	87.39	12.61
Lahore	86.79	13.21	85.33	14.67
Layyah	0.00	100.00	0.00	100.00
Lodhran	27.31	72.69	3.05	96.95
Mandi Bahauddin	45.97	54.03	32.90	67.10
Mianwali	40.40	59.60	45.35	54.65
Multan	69.29	30.71	83.12	16.88
Muzaffargarh	95.65	4.35	91.84	8.16
Nankana Sahib	-	-	68.88	31.12
Narowal	0.00	100.00	0.00	100.00
Okara	29.16	70.84	61.05	38.95
Pakpattan	1.87	98.13	0.33	99.67
Rahimyar Khan	30.65	69.35	8.42	91.58
Rajanpur	100.00	0.00	0.00	100.00
Rawalpindi	97.87	2.13	95.42	4.58
Sahiwal	93.98	6.02	76.05	23.95
Sargodha	54.58	45.42	53.80	46.20
Sheikhupura	93.57	6.43	88.96	11.04
Sialkot	97.55	2.45	99.66	0.34
Toba Tek Singh	39.31	60.69	29.77	70.23
Vehari	55.81	44.19	90.65	9.35

Source: Author's calculations.

A closer look shows that Sheikhupura and Lahore rank highest in terms of the number of industries present in 2000/01, i.e., 67 and 112 industries, respectively (Table 3). They also account for among the highest shares of manufacturing employment. For 2000/01, 94 percent and 87 percent of the total manufacturing labor is production labor employed in Sheikhupura and Lahore, respectively (Table 4).

Figure 3 and Table 3 show the distribution of the use of both types of workers as the ratio of nonproduction to production workers in each district. This ratio is 0.28 and 0.24 for Lahore and Sheikhupura, respectively (Table 3). This result reflects the HOS theorem: given the relative abundance of production labor in Lahore and Sheikhupura, their wage bill for nonproduction workers is relatively high.

Figure 3: Ratio of nonproduction to production workers, by district

A similar picture emerges for Faisalabad, which is significant at the 5 percent level for 2000/01. According to the estimated coefficient, the relative wage bill for nonproduction workers is 91 percent greater than the relative wage bill for nonproduction workers in the rest of Punjab (Table 2). Again, around 92 percent of the manufacturing labor in this district is employed in production labor-intensive industries, implying that Faisalabad is heavily endowed with production labor, which leads to a higher wage for nonproduction workers in Faisalabad. The ratio of nonproduction to production workers is 0.23 (Table 3), which also indicates an abundance of production workers.

It is important to mention here that all the significant districts represent a larger number of observations. This has a positive impact on the result and the denominator is different in this case. When the district in the

numerator has many observations, the denominator will be based on far fewer observations since the district in the numerator is excluded from the "base" relative wage in the denominator. The "base" relative wage is, therefore, less representative. As it turns out, it also falls significantly in these cases, likely because there are fewer nonproductive workers in the remaining districts used to calculate the "base" relative wage.

Gujrat, Kasur, Attock, and Sargodha are significant at the 10 percent level and have positive coefficients (Table 2).[4] In Gujrat, 99 and 97 percent of labor is employed in production labor-intensive industries, respectively, for both years (Table 4), implying an abundance of production labor. The sign of the coefficient is in line with the HOS theorem.

Similarly, Sargodha has around 55 percent of its labor employed in production labor-intensive industries for both years, which is in line with the HOS theorem. The ratio of nonproduction to production workers is less than 0.5, confirming this. The sign is justified in the case of Attock where 83 percent of manufacturing employment is concentrated in production labor-intensive industries. In Kasur, 96 percent of manufacturing employment is in production labor-intensive industries and the ratio of nonproduction to production workers is less than 0.3, confirming the significant positive sign (Table 4).

An important observation from the analysis is that almost all the significant districts in Table 2 belong to the industrial hub of central Punjab. They also account for the highest share of manufacturing employment and the highest number of industries located there. One exception is, however, Dera Ghazi Khan, which is significant at all levels with a positive sign. This is in line with the theory as it is heavily endowed with production labor. The coefficient of the district is very high and is greater than 1 for 2000/01 (Table 2).

However, this coefficient is based on only six industries operating there, which may be responsible for the large value. Most industries in Dera Ghazi Khan produce cement and related products such as lime, basic agricultural equipment, and cotton and related products.

Our analysis of the 2005/06 data gives similar results. Again, Lahore, Sheikhupura, and Faisalabad are highly significant and positive (Table 2), in line with the theory as they are heavily endowed with production labor. Sargodha, Gujrat, and Gujranwala are significant at the

[4] Gujrat and Sargodha are significant for both years, but Attock and Kasur are significant for 2000/01.

10 percent level with a positive sign, given that they have abundant production labor. The ratio of both workers is also less than 1, giving the same result (Table 2).

Narowal and Rajanpur are the only two significant districts with a negative sign. These results are on the basis of only three observations (industries operating in the district). A negative sign would imply that, on average, the relative wage bill for nonproduction workers in these districts is lower than the relative wage bill for nonproduction workers in Punjab. Table 4 supports this result: 100 percent of manufacturing workers are employed in skill-intensive industries, leading to the conclusion that production labor is scarce.

However, on closer examination of the ratio of nonproduction to production workers for each district, we see that the number of production workers is relatively greater for Rajanpur. Two of the three industries present in these districts are common to both: grain milling and industries processing animal fat byproducts. In addition, Rajanpur has a sugar industry and Narowal manufactures engines and motors. Other than the latter, none of the other industries is very skill-intensive, which implies that these results are due mainly to the thinness of the formal manufacturing sector in these regions. It can also be argued that these industries are highly mechanized and require fewer production workers.

A comparison of 2000/01 and 2005/06 shows that, by and large, the coefficients that are statistically significant in both years are stable both in terms of size and sign. There is a minor increase in magnitude, moving from 2000/01 to 2005/06. Stable coefficients indicate low mobility of labor because labor movements from one region to another should eliminate factor price inequalities (workers move from places where their skill is in abundance and earns a relatively lower wage to districts where their skill is scarce and will receive a wage premium). However, highly stable and increasing coefficients clearly point to likely hindrances to labor mobility, which has led not only to FPE failure but also increased the wage gap between nonproduction and production workers in the period studied.

As Table 2 shows, there are some significant districts for which the significance and signs have changed. Among them, Rawalpindi is significant only for 2005/06. In the case of Rajanpur, the size, significance, and sign all change considerably over the period studied. This may be a result of very few observations for 2000/01. Table 1 shows that Rajanpur accounts for less than 0.1 percent of total manufacturing employment. Dera Ghazi Khan also has a highly variable coefficient: while the number of

industries remains the same, the percentage share of total manufacturing employment falls from 2 to 0.8 percent.

Attock is also significant at 10 percent for 2000/01 but not for 2005/06 (Table 2). The reason for this could be a change in endowments as the ratio of nonproduction to production workers doubles over time from 0.2 to 0.4 (Table 5). This change suggests a relatively large number of nonproduction workers, which may have led to the removal of wage differences. Similarly, Rawalpindi is significant for 2005/06 but not for 2000/01 (Table 2).

We would normally expect large cities belonging to the industrial hub, such as Lahore, Faisalabad, Gujrat, and Sargodha, among others, to have a relatively high number of nonproduction workers, given there are more educational opportunities available here. The more plausible explanation is that, in these areas, nonproduction workers are engaged in other sectors, mainly in services. In most districts in central Punjab and mainly in the industrial hub, white-collar workers have numerous opportunities to work in other sectors, particularly the services sector, which currently makes up more than 50 percent of GDP and employs at least a third of the workforce (Ahmed & Ahsan, 2011).

Nonproduction workers may be inclined to work in sectors other than manufacturing, resulting in the creation of an artificial shortage of nonproduction workers in this sector. Thus, the movement of nonproduction workers to the services sector might explain the relatively low number of nonproduction workers.

The results for Pakistan are similar to those obtained when testing for RFPE in Mexico by Bernard et al. (2010). They conclude that the uneven distribution of factors explains the relative factor price inequality. In the case of Pakistan, we trace this to lumpy factors of production. The extent of individual coefficient significance is slightly different. For Mexico, almost all the coefficients are significant, but for Pakistan fewer districts have a relative wage that is statistically different from the Punjab average. Thus, factors are somewhat more evenly distributed in Pakistan's case, which leads to less variation in factor prices.

The direction is different for Mexico, where nonproduction workers are the abundant factor. Production workers thus receive a wage premium and the coefficient signs are mostly negative. For Pakistan, however, the coefficient signs are positive because nonproduction workers are relatively scarce. There is also a difference in the size of coefficients: in

Bernard et al. (2010), the coefficients are smaller and less than 1 on average; in our analysis, the coefficients are larger.

This could be due to the absence of rich data such as that of Mexico, where the number of industries present in each district is significantly higher and there is less variation in factors and industries across districts. In other words, the data for Pakistan features sharp variations in the number of industries and employment across regions. This lumpiness contributes to the higher difference in factor prices for Pakistan. The difference in magnitude is also an indicator of greater factor price inequality as there is more variation in prices between the districts and the base region.

There are few significant district dummies in our regressions. This may also be due to data problems. In some districts, there were too few industries for a coefficient to be estimated. Narowal and Vehari were dropped from the regression for 2000/01 because only two and three industries, respectively, operate in these districts and there were not enough observations to include in the regression. Similarly, only three industries were operating in Layyah in 2005/06, yielding too few observations to retain it. Finally, Nankana Sahib is absent in the 2000/01 regression because it was not a separate district in the CMI for 2000/01.

5.2. Mincerian Wage Regression Test

The methodology developed by Bernard et al. (2010) is used to estimate differences in worker quality, given that variations in this can affect relative wages. We test for the relationship between relative endowments and wages after accounting for observable differences in worker quality. The intuition behind this is to eliminate the effect of worker quality on wage differences and determine if the endowment of factors explains the variation in factor prices.

As explained in Section 4, the variation in prices could simply be due to variations in worker quality. After adjusting for worker quality, we expect to find an inverse relationship between quantity (relative endowment) and wages. Thus, in areas that are heavily endowed with production workers, nonproduction workers will have the benefit of a wage premium.

The PSLMS for 2008/09 is used for this analysis and a Mincerian wage equation is calculated for every district. Since the survey does not report the industry to which an individual belongs, we restrict our analysis to the district level. In the absence of any measure of work experience, we

use age as a proxy.[5] After running the Mincerian wage regressions, the coefficient for the quality-adjusted wage for every district is calculated by taking the constant term from the regressions for every district.

The ratio $\frac{\alpha_{ij}{}^{n}}{\alpha_{ij}{}^{p}}$ is calculated by dividing the alphas for both types of workers for every district. This gives the relative wage independent of the effect of observed characteristics (worker quality). To calculate the worker quality-adjusted workforce, we compute the estimated wage from equation (2) (see previous section) for every district and type of worker. The estimated wage is then divided by alpha to remove any impact of worker quality. Summing $\frac{w'}{\alpha}$ for production and nonproduction workers for every district gives us an estimate for the number of quality-adjusted production and nonproduction workers in each district.

Table 5 gives estimates for both $\frac{\alpha_{ij}{}^{n}}{\alpha_{ij}{}^{p}}$ and $\frac{w'}{\alpha}$ for all 35 districts. The coefficient in the regression of the quality-adjusted wage on the quality-adjusted relative quantities of nonproduction and production labor is 0.034 and statistically insignificant. As we have only 35 districts, we also take the correlation coefficient of both series, which is 0.0608. This low value implies that there is a weak relationship between the wage ratio (the relative wage of nonproduction to production workers) and the quantity ratio (the relative endowment of nonproduction to production workers).

The results indicate that the relative wage ratio positively affects the quantity ratio, but nothing more concrete can be concluded because the coefficient is insignificant. This contravenes our expectations: according to the literature, there should be a negative relationship between the quality-adjusted wage quantity ratio and the quality-adjusted wage when factors are lumpy. For instance, a relatively large number of nonproduction workers operating in a region will experience a relatively lower wage in comparison with production workers.

The argument is identical to the HOS theorem that the relatively abundant factor will experience lower returns. Bernard et al. (2010) carried out a similar analysis to examine reasons for the lack of relative factor price inequality. In other words, can the absence of RFPE be explained by the presence of a lumpy factor distribution? The deviations from RFPE are less severe for Pakistan than for Mexico and so the absence of a significant

[5] A reviewer has suggested using the latest PSLMS, which provides information on experience. However, given that the first part of the study uses the CMI for 2005/06, we feel that the wage data from the PSLMS for 2008/09 is closer to that for 2005/06 and is, therefore, the better choice.

inverse relationship between wage ratios and wage quantity is not unjustified. However, our analysis is not as precise as Bernard et al. (2010) since the PSLMS does not provide information about the industry in which workers are employed and, therefore, the analysis is restricted to the district level (rather than the industry level).

Table 5: Adjusting for worker quality

District	α^n/α^p	W/α
Sahiwal	1.000	0.246
Chakwal	1.404	0.280
Narowal	2.180	0.305
Sialkot	1.415	0.351
Gujrat	0.647	0.356
Gujranwala	0.549	0.402
Nankana Sahib	2.024	0.426
Hafizabad	1.116	0.428
Mandi Bahauddin	0.350	0.451
Vehari	1.204	0.452
Bhakkar	0.742	0.492
Bahawalpur	0.350	0.500
Attock	0.680	0.537
Okara	0.379	0.596
Khushab	0.714	0.633
Rawalpindi	0.916	0.641
Sheikhupura	1.107	0.696
Muzaffargarh	0.513	0.737
Kasur	0.853	0.799
Jhelum	0.679	0.816
Pakpattan	0.346	0.821
Mianwali	0.759	0.903
Faisalabad	0.535	0.963
Khanewal	0.631	1.114
Jhang	0.449	1.173
Multan	0.612	1.202
Sargodha	0.442	1.328
Toba Tek Singh	0.378	1.341
Lahore	0.748	1.506
Bahawalnagar	0.900	1.564
Lodhran	0.932	1.791
Rajanpur	1.045	1.858
Rahimyar Khan	0.870	2.166
Dera Ghazi Khan	1.203	3.147
Layyah	1.444	3.788

Source: Author's calculations

A closer look at Table 5 illustrates the point established in the previous analysis: on average, Pakistan has abundant production workers. The data in Table 5 is organized by increasing values of the quality-adjusted worker ratio of nonproduction to production workers. Clearly, in most regions, nonproduction workers are relatively scarce. We can also compare our earlier results (where quality adjustments had not been made) to the numbers here. This reveals some interesting points.

First, the signs of almost all the statistically significant coefficients from the earlier FPE regressions (Table 2) are justified. For districts situated in the industrial hub, such as Gujrat, Gujranwala, Faisalabad, and Sheikhupura, the value of quality-adjusted workers is less than 1, which indicates that, after adjusting for worker quality, the number of production workers is still greater than nonproduction workers. Only for Lahore and Sargodha is the ratio greater than 1, which implies that they have a larger number of nonproduction workers (in contrast to the results in Table 2).

Second, after adjusting for quality, relative endowments have risen.[6] This is because most of the values in Table 3 are lower than 0.5, while the Table 5 gives higher values. This is important because the counterintuitive result we obtained for the industrial hub in the previous section does not hold firmly for this analysis. Although the values are still less than 1, the relatively higher values indicate that, after adjusting for worker quality, nonproduction workers are relatively large in number.

It may be either that, if we account for differences in worker quality, the number of production workers has effectively fallen or that the effective number of nonproduction workers has risen. It is very difficult to establish a clear relationship between factor endowments and their returns, but the earlier results on the scarcity of white-collar worker are confirmed. There may also be a persistently uneven distribution of factors across districts, even after controlling for worker quality differences.

6. Conclusion

This paper has examined RFPE across the districts of Punjab. We find that wages differ significantly across the province, given that all the district dummies are jointly significant. The individual coefficients tend to be significant in districts with a large number of industries. The size of almost all coefficients is found to be positive, which means that the relative wage bill of a nonproduction worker in a district is higher than that of a nonproduction

[6] Endowments for the previous analysis are given in Table 3 and also shown in the form of a graph.

worker in the rest of Punjab. These results are in line with the HOS theorem: as the scarce factor, nonproduction labor enjoys a wage premium.

We have established the presence of factor price inequality from the data, but not to the extent suggested by studies conducted for other countries using the same methodology. This can be attributed to data shortcomings or to the argument that, in Pakistan, there is less variation in factor prices compared to other countries. There is also no correlation between factor endowment and return because there is no inverse relationship between the quantity ratio and wage ratio, even after adjusting for observed quality.

Another interesting pattern observed is the presence of more blue-collar workers in relatively better developed areas in central Punjab, where the ratio of nonproduction to production workers representing the district-wise endowment is less than 1. This is different from our expectations and shows that, even in relatively developed areas of the province, nonproduction workers are scarce in the manufacturing sector.

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The Effectiveness of Corporate Governance in Constraining Earnings Management in Pakistan

Aysha S. Latif* **and Fahad Abdullah****

Abstract

Although firms' annual reports are supposed to provide an unbiased and accurate picture of their financial position, managers may be induced to engage in earnings management in order to circumvent expectations. Such incentives can take the shape of stock prices, management incentives, or debt covenants. The purpose of this study is to investigate the effectiveness of three attributes of corporate governance in constraining earnings management practices. These include board characteristics, audit committee characteristics, and ownership structure. Based on a sample of 120 nonfinancial firms listed on the Karachi Stock Exchange during 2003–12, we find that audit committee independence is negatively associated with earnings management, while CEO duality and institutional shareholding is positively associated with earnings management. Moreover, the effectiveness of governance mechanisms in constraining earnings management practices differs across high- and low-growth firms.

Keywords: Earnings management, financial statements, corporate governance, board characteristics, audit committee characteristics, ownership structure, Pakistan.

JEL classification: G34.

1. Introduction

The International Financial Reporting Standards (IFRS) allow firm managers greater flexibility in choosing from among alternative accounting treatments. These choices can have different effects on a firm's reported income. Islam, Ali, and Ahmad (2011) argue that managers tend to prefer accounting choices that benefit them economically. The likelihood of this opportunistic behavior rises in the presence of weak governance structures, eventually causing the quality of reported earnings to deteriorate and reducing investors' confidence in financial reports (González & García-Meca, 2014). This opportunistic behavior,

* Lecturer, University of Peshawar.
** Assistant professor, Institute of Management Sciences, Peshawar.

known as earnings management, entails the creative use of accounting techniques in such a way that the financial reports produced give an overly positive picture of firms' business activities and financial position. Earnings management can include changes in the estimated amount of assets impaired, the volume of bad debts written off, the amount of inventory recorded, the estimated useful life of long-term assets, and estimated post-employment benefits and warranty costs (McKee, 2005).

Prior studies suggest that good governance is crucial in monitoring managerial activities because it helps reduce agency costs by aligning the interests of the management and owners. Several studies have examined the role of corporate governance in earnings management and found that good governance can effectively constrain managers from being involved in earnings management practices (see Jiang, Lee, & Anandarajan, 2008; Dimitropoulos & Asteriou, 2010; Alzoubi & Selamat, 2012; González & García-Meca, 2014).

This study is motivated by two considerations. First, investment or capital is crucial for an emerging economy such as Pakistan where the domestic saving rate is only 13.5 percent of gross domestic product: this is insufficient to ensure economic growth of at least 7–8 percent a year. Second, the country's investment climate is not attractive, given that firms involved in earnings management are liable to spread false information in the market. This induces investors to make sale or purchase decisions that lead to losses, ultimately eroding their confidence. In order to attract more capital and enhance investor confidence, companies need to provide an attractive investment climate and good governance, increase overall transparency, and reduce information asymmetry.

In this context, the study's first objective is to examine the effectiveness of corporate governance mechanisms in constraining earnings management. We do so by looking at eight such mechanisms grouped into three categories: (i) board characteristics, (ii) audit committee characteristics, and (iii) ownership structure.

Our second objective is to investigate whether the role of corporate governance in constraining earnings management differs between high- and low-growth firms. This builds on the argument presented by Bowen, Rajgopal, and Venkatachalam (2008) that the market severely penalizes high-growth firms for negative earnings surprises. This suggests there is a strong incentive for high-growth firms to meet earnings benchmarks, perhaps to maintain their capital or avoid a higher cost of capital. Moreover, Cohen,

Krishnamoorthy, and Wright (2004) indicate that the impact of governance mechanisms differs with a firm's growth opportunities.

The study contributes to the existing literature in the following ways. First, it extends the very limited research on the relationship between corporate governance and earnings management in Pakistan by providing a detailed and comprehensive picture of this association. Second, it analyzes the empirical evidence on growth differences in this relationship, which has not yet been done.

Section 2 provides a comprehensive literature review, on the basis of which we formulate a series of hypotheses. Section 3 describes the variables used as well as the sample and data sources employed. It also presents the study's methodology and specifies the econometric model to be tested. Section 4 discusses the empirical findings and Section 5 concludes the study.

2. Literature Review

This section provides a literature review for each of the variables used in the study.

2.1. Earnings Management

Healy and Wahlen (1999) define earnings management as the use of managerial judgment in structuring transactions to alter financial reports either to misinform stakeholders with respect to the firm's performance or to reap the benefit of a contractual outcome that is dependent on accounting numbers. Managers thus estimate future economic events at their discretion and these are reflected in firms' financial reports. Such events can include salvage value and the expected life of long-term assets, deferred taxes, asset impairment, losses from bad debts, and post-employment benefits.

Managerial discretion also influences the choice of acceptable accounting methods for inventory costing, such as last-in-first-out (LIFO), first-in-first-out (FIFO), and average cost. These can have a significant impact on accounting outcomes in different economic conditions (Zhang, Shi, Gao, & Wang, 2014) and on recording transactions such as accelerated depreciation or the straight-line method. Waweru and Riro (2013) argue that managers also use their discretion in working capital management such as in receivables policies, the timing of inventory purchases, and inventory levels. All these affect net revenues and cost allocations.

In earnings management, accounting choices are made to reflect either increased or decreased income. For example, in certain instances, stockholders and managers may agree that earnings management is desirable and choose to apply income-decreasing accounting choices to avoid incurring regulatory or political costs (Peasnell, Pope, & Young, 2005). On the other hand, when the interests of shareholders and managers diverge, this gives rise to moral hazard. Almilia (2009) notes that agency theory is an important construct in understanding financial reporting incentives. Agency theory holds that, in the presence of information asymmetries, managers will choose to make a set of decisions that maximize their usefulness.

2.2. Corporate Governance and Earnings Management

Broadly, corporate governance refers to the processes, rules, or laws under which a company is directed. These are intended to ensure fairness, transparency, and accountability in its relationship with all stakeholders. The concept of corporate governance assumed considerable importance following a wave of high-profile corporate corruption scandals (Standard and Poor's, 2003), most of which were traced to earnings management.

The theories put forward with respect to corporate governance include agency theory, stakeholder theory, and stewardship theory. Of these, agency theory has been the most influential: it states that managers pursue self-interested strategies and will not act to maximize shareholders' wealth unless an appropriate governance structure is implemented to safeguard the latter's interests (Jensen & Meckling, 1976). Codes of corporate governance support the concept of independence and a balance of power in the boardroom; they seek to protect shareholders' rights and recognize the importance of transparency and disclosure. Jiang et al. (2008) argue that corporate governance is critical to better financial reporting, and suggest that higher levels of corporate governance are associated with lower discretionary accruals (i.e., earnings management) and higher-quality earnings.

2.3. Board Characteristics

In any firm, the board of directors is the main decision-making body and its composition has an important impact on the quality of reported earnings. Dimitropoulos and Asteriou (2010) show that the informativeness of annual accounting earnings is positively related to the

number of outside directors serving on the board. Alzoubi and Selamat (2012) observe that a board comprising primarily external directors is better placed to control and monitor management. This reduces the agency problem inherent in any firm and improves financial reporting quality. Based on the literature, our first hypothesis (H1) is that board independence is negatively related to earnings management.

Jensen (1993) argues that chief executive officer (CEO) duality—that is, when the CEO also serves as board chairperson—enables a more flexible environment for the firm's management, allowing the CEO to control what information is available to other directors. Davidson, Jiraporn, Kim, and Nemec (2004) conclude that CEO duality gives the CEO greater control over the perception created by the firm's financial reports. This concentrates more power in the CEO's position and allows greater managerial discretion. Thus, our second hypothesis (H2) is that CEO duality is positively related to earnings management.

Additionally, the size of the board significantly influences its ability to monitor. Jensen (1993) argues that a small board can monitor the CEO's actions more effectively because a larger board might be more likely to concern itself with etiquette at the expense of monitoring. Abbott, Parker, and Peters (2004) find that small boards communicate more effectively and with fewer misunderstandings. Small boards are also more sensitive to issues affecting investor confidence, particularly in financial reporting and, therefore, less likely to engage in earnings management. Thus, our third hypothesis (H3) is that the size of the board is positively associated with earnings management.

Board meetings provide an opportunity to discuss issues related to the firm. Chen, Firth, Gao, and Rui (2006) observe that the potential for fraud is reduced when the board meets frequently because this allows the directors to identify and resolve any potential problems. Based on this, we expect an inverse relationship between board meetings and earnings management. Our fourth hypothesis (H4) is that the frequency of board meetings is negatively related to earnings management.

2.4. Audit Committee Characteristics

Essentially, audit committees must remain independent to be able to carry out their oversight-related functions. Klein (2002) finds that the independence of an audit committee is negatively related to earnings management. Alzoubi and Selamat (2012) and Mansor, Che-Ahmad,

Ahmad-Zaluki, and Osman (2013) conclude that larger audit committees with a greater degree of independence perform better as oversight bodies. Based on these studies, our fifth and sixth hypotheses are as follows:

- H5: Audit committee size is negatively related to earnings management.
- H6: The independence of the audit committee is negatively related to earnings management.

2.5. Ownership Structure

Given that ownership structure is an effective governance mechanism, one of our aims is to examine the impact of insider and institutional shareholding on earnings management. Cornett, Marcus, Saunders, and Tehranian (2006) argue that insider shareholders may choose to manipulate earnings to improve the firm's perceived performance and to increase their personal wealth. This may be to attract investors and to unload shareholding. Beneish and Vargus (2002) point out that insider sales of shares increase in periods of inflated earnings. However, when managers want to retain the firm's ownership stake, they become more conscious of its true performance. Managers may also practice earnings management when given the incentive of political or regulatory costs. Klein (2002), for instance, argues that managers in tax-oriented reporting regimes are motivated to manipulate earnings. The study's seventh hypothesis (H7) is that insider ownership is positively associated with earnings management.

Hartzell and Starks (2003) find that institutional investors are able to restrain management from self-serving activities, which suggests that the former should be negatively related to earnings management. However, another body of knowledge suggests that institutional investors are "transient investors" who focus on short-term earnings and pressure the management into delivering higher consistent earnings (Bushee, 1998). Cornett et al. (2006) also show that, to meet these earnings goals, the management may become involved in earnings manipulations. Based on this discussion, our eighth hypothesis (H8) is that institutional ownership is positively related to earnings management.

3. Methodology

This section describes the sample and variables used, and presents the study's methodology.

3.1. Sample and Data Sources

The sample comprises 120 nonfinancial firms listed on the Karachi Stock Exchange (KSE) from 2003 to 2012. Only those firms were included in the sample for which at least three years' data were available. The data on ownership structure were taken from the pattern of shareholding described in the firms' financial reports. The data on board size, audit committee size, and CEO duality were obtained from the firms' profiles. Details of board independence and audit committee members were obtained from each firm's statement of compliance. Data on board meetings were taken from the director's report in each case. Finally, share prices were obtained from the KSE website.

3.2. Earnings Management

The notion behind accruals accounting is that there is a difference between cost and expenditure versus benefits and revenues. As a result, net income can be seen as an adjustment of the operational cash flow for transitory components; these adjustments are called accruals (Abed, Al-Attar, & Suwaidan, 2012). Dechow, Sloan, and Sweeney (1996) argue that accruals are more open to discretion than cash flows. Previous studies have often used discretionary accruals (the difference between total accruals and nondiscretionary accruals) as a proxy for earnings management (see Peasnell et al., 2005; Islam et al., 2011).

3.3. Measurement of Total Accruals

Total accruals can be measured using either the cash flow approach or the balance sheet approach. Hribar and Collins (2002) show that, in some circumstances, the latter is inferior to the cash flow approach. Having weighed both, however, most researchers prefer to use the cash flow approach and this study follows suit. Thus, total accruals are measured as the difference between net income (NI) and the cash flow from operations (CFO):

$$TA_t = NI_t - CFO_t$$

where, in year t, TA_t represents total accruals, NI_t represents net income, and CFO_t represents the cash flow from operations.

3.4. Measurement of Discretionary Accruals

Discretionary accruals are computed as the difference between total accruals and nondiscretionary accruals:

Total accruals (TA_{it}) = nondiscretionary accruals (NDA_{it}) + discretionary accruals (DA_{it})

The original Jones model developed in 1991 estimates nondiscretionary accruals using the following equation:

$$\frac{TA_{it}}{Assets_{it-1}} = \alpha_0 \left(\frac{1}{Assets_{it-1}}\right) + \beta_1 \left(\frac{\Delta REV_{it}}{Assets_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{Assets_{it-1}}\right) + \epsilon_{it} \quad (1)$$

The subscript *it* represents firm *i* and year *t*. ΔREV is the change in revenue and PPE represents property, plant, and equipment.

Dechow et al. (1996) compare various models used to measure accruals and develop a modified form of the Jones model, which can better detect accruals management. The modified Jones model adjusts the change in revenue with the change in receivables in the original model in order to reduce the measurement error of accruals when a firm's management uses its discretion in revenues. Thus, the modified model estimates nondiscretionary accruals as follows:

$$\frac{TA_{it}}{Assets_{it-1}} = \alpha_0 \left(\frac{1}{Assets_{it-1}}\right) + \beta_1 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{Assets_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{Assets_{it-1}}\right) + \epsilon_{it} \quad (2)$$

where ΔREC is the change in receivables.

McNichols (2000) argues that firms with a higher rate of growth tend to have more accruals. Thus, to capture the growth factor, the book-to-market (BM) ratio is incorporated in the modified Jones model to yield the augmented Jones model (Cohen, Dey, & Lys, 2004) given below:

$$\frac{TA_{it}}{Assets_{it-1}} = \alpha_0 \left(\frac{1}{Assets_{it-1}}\right) + \beta_1 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{Assets_{it-1}}\right) + \beta_2 \left(\frac{PPE_{it}}{Assets_{it-1}}\right) + \beta_3 CFROA_{it} + \beta_4 BM_{it} + \epsilon_{it} \quad (3)$$

where

$$\frac{NDA_{it}}{Assets_{it-1}} = \hat{\alpha}_0 \left(\frac{1}{Assets_{it-1}}\right) + \hat{\beta}_1 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{Assets_{it-1}}\right) + \hat{\beta_2} \left(\frac{PPE_{it}}{Assets_{it-1}}\right) + \hat{\beta_3} CFROA_{it} + \hat{\beta_4} BM_{it} \quad (3.1)$$

Discretionary accruals can be written as:

$$\frac{DA_{it}}{Assets_{it-1}} = \frac{TA_{it}}{Assets_{it-1}} - [\hat{\alpha}_0(\frac{1}{Assets_{it-1}}) + \hat{\beta}_1\left(\frac{\Delta REV_{it}-\Delta REC_{it}}{Assets_{it-1}}\right) + \hat{\beta_2}(\frac{PPE_{it}}{Assets_{it-1}}) + \hat{\beta_3}CFROA_{it} + \hat{\beta_4}BM_{it}] \quad (3.2)$$

CFROA is the cash flow return on assets and is measured as income before interest and taxes plus depreciation divided by total assets. BM is measured as the book value of equity divided by the market value of equity.

Other studies have used cross-sectional versions of the Jones and modified Jones models to estimate discretionary accruals (see DeFond & Jiambalvo, 1994; Bartov, Gul, & Tsui, 2000). Bartov et al. (2000), for instance, compare these cross-sectional versions with their time-series counterparts and find that the former are better able to detect earnings management. Accordingly, we have also estimated cross-sectional models to detect discretionary accruals.

3.5. Model Specification for Governance Mechanisms and Earnings Management

The study examines the effect of eight corporate governance mechanisms in constraining earnings management, where the control independent variables include leverage, CEO compensation, and firm size. We develop the following regression model to determine the relationship between governance mechanisms and earnings management:

$$\frac{DA_{it}}{Assets_{it-1}} = \alpha_0 + \beta_1 IBOARD_{it} + \beta_2 CEO_{it} + \beta_3 SBOARD_{it} + \beta_4 MBOARD_{it} + \beta_5 SAC_{it} + \beta_6 IAC_{it} + \beta_7 POI_{it} + \beta_8 POINST_{it} + \beta_9 LEV_{it} + \beta_{10} COMP_{it} + \beta_{11} LASSET_{it} + \epsilon_{it} \quad (4)$$

IBOARD is board independence, measured as the percentage of independent directors on the board. CEO duality is a dummy variable that takes the value of 1 when the CEO is also the board chairperson and 0 otherwise. SBOARD is the size of the board, measured as the number of board directors. MBOARD is the natural log of the number of board meetings held during the year. SAC represents the number of members on the audit committee. IAC represents audit committee independence, measured as the percentage of nonexecutive directors on the committee. POI is insider ownership, measured as the percentage of equity owned by the firm's directors and managers. POINST is institutional ownership,

measured as the percentage of equity owned by institutional investors. LEV is leverage, measured as the book value of debt divided by the firm's market value (equal to the sum of long-term debt, short-term debt, and the market value of equity). CEO compensation is denoted by COMP, which is the natural log of the amount of compensation paid to the CEO during the year. Finally, the size of the firm (LASSET) is measured by taking the natural log of its total assets.

4. Results and Discussion

Table 1 gives the estimation results for the cross-sectional versions of the Jones model, modified Jones model, and augmented Jones model. The coefficients in each case are significant and have the same sign, but the explanatory power of the models is different. The augmented Jones model yields an R-squared value of 24.74 percent, which is higher than that of the other two models. Based on this, we opt to use the augmented Jones model, and measure nondiscretionary and discretionary accruals using equations 3.1 and 3.2.

Table 2 shows that the mean of discretionary accruals is almost 0. This is because, at some point, discretionary accruals are reversed and assume an average value of 0 in the long run. The average proportion of independent board members is 0.22 with a minimum value of 0. The sample firms have between 14 (maximum) and six (minimum) members. Board and executive members own, on average, 18 percent of total equity and the maximum shareholding by insiders is 98 percent. Institutional shareholdings range from 0 to 97 percent. On average, the proportion of outside members on the audit committees is 0.8.

Table 1: Cross-sectional estimates of Jones, modified Jones, and augmented Jones models

Dependent variable = $\frac{TA_{it}}{ASSETS_{it-1}}$

t-statistics					
Jones model (1)		**Modified Jones model (2)**		**Augmented Jones model (3)**	
$\frac{\Delta REV_{it}}{Assets_{it-1}}$	0.0945***	$\frac{\Delta REV_{it} - \Delta REC_{it}}{Assets_{it-1}}$	0.0778***	$\frac{\Delta REV_{it} - \Delta REC_{it}}{Assets_{it-1}}$	0.0264*
	(6.3283)		(5.0833)		(1.8579)
$\frac{PPE_{it}}{Assets_{it-1}}$	-0.0591***	$\frac{PPE_{it}}{Assets_{it-1}}$	-0.0595***	$\frac{PPE_{it}}{Assets_{it-1}}$	-0.0417**
	(-3.1883)		(-3.1789)		(-2.4572)
–	–	–	–	CFROA	0.6235***
					(13.5121)
–	–	–	–	BM	0.0054*
					(1.8907)
Constant	0.0280**	Constant	0.0326***	Constant	-0.0344***
	(2.3869)		(2.7654)		(-2.8564)
R-squared	0.0678	R-squared	0.0495	R-squared	0.2474
F-test	25.33***	F-test	18.12***	F-test	57.05***

Note: ***, ** and * = significant at 1 percent, 5 percent, and 10 percent level, respectively.
Source: Authors' calculations.

Table 2: Descriptive statistics

	DA	IBOARD	SBOARD	MBOARD	SAC	IAC	POI	POINST	LEV	COMP	LASSET
Mean	0.00	0.22	8.27	1.65	3.41	0.79	0.18	0.23	0.48	8.03	15.31
Standard error	0.01	0.01	0.06	0.01	0.03	0.01	0.01	0.01	0.01	0.10	0.06
Median	-0.01	0.13	8.00	1.61	3.00	0.75	0.06	0.18	0.48	8.80	15.42
Range	1.63	0.93	8.00	3.17	4.00	1.00	0.98	0.97	0.99	12.24	10.36
Minimum	-0.86	0.00	6.00	0.39	2.00	0.00	0.00	0.00	0.00	0.00	8.79
Maximum	0.78	0.93	14.00	3.56	6.00	1.00	0.98	0.97	0.99	12.24	19.15

Source: Authors' calculations.

The correlation matrix presented in Table 3 shows that discretionary accruals are negatively correlated with the independence of the audit committee and board meetings. Insider shareholding and board independence are weakly correlated with discretionary accruals. Discretionary accruals are positively correlated with CEO duality, institutional shareholding, and CEO compensation. Board independence is positively correlated with board and firm size, indicating that larger firms

need more members on their board and usually assign these additional seats to outside members. A positive correlation exists between firm size and the size of the audit committee. There is a negative correlation between audit committee independence and insider ownership.

Table 3: Correlation analysis

Variable	DA	IBOARD	CEO	SBOARD	MBOARD	SAC	IAC	POI	POINST	LEV	COMP	LASSET
DA	1.00											
IBOARD	-0.01	1.00										
CEO	0.19	-0.03	1.00									
SBOARD	-0.01	0.20	-0.26	1.00								
MBOARD	-0.12	-0.01	-0.08	0.01	1.00							
SAC	0.03	0.21	-0.18	0.44	0.02	1.00						
IAC	-0.16	0.13	-0.22	0.24	-0.02	0.12	1.00					
POI	-0.04	-0.20	0.20	-0.21	-0.02	-0.20	-0.20	1.00				
POINST	0.17	0.18	0.11	0.06	-0.09	0.08	0.01	-0.26	1.00			
LEV	0.00	-0.12	0.16	-0.15	-0.04	-0.17	-0.05	0.23	-0.14	1.00		
COMP	0.11	0.09	-0.13	0.27	-0.03	0.18	-0.01	-0.25	0.04	-0.23	1.00	
LASSET	-0.12	0.11	-0.20	0.32	0.32	0.35	0.29	-0.15	0.01	-0.15	0.25	1.00

Source: Authors' calculations.

Table 4 gives the full sample regression results. We have used panel data regression to test our hypotheses. In column 1, the dependent variable (discretionary accruals) is regressed on all the independent and control variables. In columns 2, 3, and 4, discretionary accruals are regressed on the attributes categorized under board characteristics, audit committee characteristics, and ownership structure, respectively.

Although we would expect board independence to be negatively associated with earnings management, our results indicate no significant relationship between board independence and discretionary accruals. We therefore reject the null hypothesis in this case. The second hypothesis holds because CEO duality is positively related to discretionary accruals. The concentration of power in one position renders the CEO's monitoring role less effective because the management perceives this as having more room to maneuver.

Board size and the frequency of board meetings indicate how active a role the board can play in reducing earnings management. Our

results, however, show that neither variable has a significant impact on the use of discretionary accruals. Accordingly, we reject the third and fourth hypotheses. We would expect the size of the audit committee to be negatively related to earnings management, assuming that a larger committee is better able to ensure the quality and integrity of reported earnings. However, the results do not indicate a significant relationship between audit committee size and earnings management, leading us to reject the fifth hypothesis.

Table 4: Full sample regression estimates

	Dependent variable = discretionary accruals			
Variable	**(1)**	**(2)**	**(3)**	**(4)**
IBOARD (board independence)	-0.0215 (-1.10)	-0.0119 (-0.61)	–	–
CEO (CEO duality)	0.0435*** (3.3.4)	0.0487*** (3.74)	–	–
SBOARD (board size)	0.0052 (1.33)	0.0062 (1.63)	–	–
MBOARD (board meetings)	-0.0176 (-1.16)	-0.0211 (-1.37)	–	–
SAC (size of audit committee)	0.0048 (0.59)	–	0.0074 (0.94)	–
IAC (audit committee independence)	-0.0635*** (-2.74)	–	-0.0736*** (-3.15)	–
POI (insider shareholding)	-0.0462* (-1.74)	–	–	-0.0233 (-0.88)
POINST (institutional shareholding)	0.0715*** (2.61)	–	–	0.0860*** (3.10)
LEV (leverage)	0.0012 (0.07)	-0.0102 (-0.56)	-0.0013 (-0.07)	0.0054 (0.29)
COMP (CEO compensation)	0.0017 (0.91)	0.0030 (1.56)	0.0027 (1.39)	0.0028 (1.47)
LASSET (firm size)	-0.0094** (-2.46)	-0.0118*** (-3.20)	-0.0121*** (-3.19)	-0.0144*** (-4.22)
CONSTANT	0.1419** (2.32)	0.1418** (2.39)	0.2027*** (3.57)	0.1855*** (3.30)
R-squared	0.2204	0.1590	0.0832	0.1423
F-test	58.68***	37.50***	31.15***	32.13***

Note: z-statistics in parentheses. ***, ** and * = significant at 1 percent, 5 percent, and 10 percent level, respectively.
Source: Authors' calculations.

We find that audit committee independence is negatively related to the use of discretionary accruals, allowing us to accept the sixth hypothesis. The presence of outside members on the committee strengthens its effective oversight, thus reducing the likelihood of corporate failure and financial fraud. Based on the first and fourth columns of Table 4, we reject the seventh hypothesis because insider shareholding does not appear to be positively related to earnings management.

We accept the eighth hypothesis because the results indicate that institutional shareholding is positively related to the use of discretionary accruals. This finding is consistent with Bushee (1998), Matsumoto (2002), Koh (2003), and Cornett et al. (2006), who find a positive association between institutional shareholding and income-increasing discretionary accruals. The rationale for this lies in Matsumoto (2002), who argues that institutional investors induce managers to engage in earnings management in order to avoid surprise negative earnings and deliver higher consistent earnings instead.

Finally, leverage and CEO compensation are not related to earnings management, but the results reveal a negative relationship between firm size and the use of discretionary accruals. This finding supports the argument that large firms are subject to greater scrutiny and, therefore, less likely to be involved in earnings management. Columns 1 to 4 (Table 4) show that the independent and control variables have almost the same relationship with earnings management.

The study's second objective is to investigate whether the role of corporate governance in constraining earnings management differs between high-growth and low-growth firms. For this, we divide the data into high- and low-growth firms. Following Mitton (2002), all firms below the median BM ratio are treated as high-growth firms while all those above the median BM ratio are treated as low-growth firms. Table 5 gives separate regression estimates for high- and low-growth firms.

The results reveal significant differences in how governance mechanisms constrain earnings management in high- and low-growth firms. CEO duality is positively related to earnings management in high-growth firms. Given that such firms have larger operations and accounting records, and are likely more diversified, CEO duality would imply that the CEO controls a significant volume of information.

The results also indicate that the more independent a firm's audit committee, the less likely will be the use of discretionary accruals; this applies to both high-growth as well as low-growth firms. Outside members on the audit committee are independent from the firm's management and, therefore, can better influence managerial discretion. The frequency of board meetings in the case of low-growth firms is related to lower levels of earnings management, where a more active board is likely to play an important role in monitoring management. While the full sample data regression (Table 4) shows that institutional shareholding is positively associated with earnings management, the separate regression results give a different picture. Table 5 shows that institutional shareholding is not related to earnings management in high-growth firms. Only in low-growth firms are transient institutional investors able to induce managers toward earnings management.

Table 5: High- and low-growth firms: Sample regression estimates

Dependent variable = discretionary accruals

	z-statistics	
Variable	**High-growth firms**	**Low-growth firms**
IBOARD (board independence)	-0.0056	-0.0304
	(-0.19)	(-1.13)
CEO (CEO duality)	0.0997***	0.0152
	(4.57)	(0.92)
SBOARD (board size)	0.0065	-0.0009
	(1.27)	(-0.14)
MBOARD (board meetings)	-0.0172	-0.0459*
	(-0.91)	(-1.89)
SAC (size of audit committee)	-0.0096	0.0177
	(-0.90)	(1.37)
IAC (audit committee independence)	-0.0813**	-0.0558*
	(-2.51)	(-1.73)
POI (insider shareholding)	-0.0500	-0.0172
	(-1.15)	(-0.48)
POINST (institutional shareholding)	0.0436	0.1228***
	(1.14)	(2.97)
LEV (leverage)	0.0211	-0.0047
	(0.71)	(-0.20)
COMP (CEO compensation)	0.0039	-0.0006
	(1.32)	(-0.24)
LASSET (firm size)	0.0223	0.0544
	(0.31)	(0.72)
R-squared	0.2212	0.1359
F-test	45.66***	24.56***

Note: ***, ** and * = significant at 1 percent, 5 percent and 10 percent level, respectively.
Source: Authors' calculations.

5. Conclusion

The first objective of this study was to investigate the effect of corporate governance in constraining earnings management. Based on the comparative predictive powers of the Jones model, modified Jones model, and augmented Jones model, we have used the third option to estimate discretionary accruals. The results show that audit committee independence is an effective corporate governance mechanism in constraining earnings management practices. Moreover, such practices increase with CEO duality and greater institutional equity shareholding.

Additionally, we find that the effectiveness of corporate governance mechanisms differs for high-growth and low-growth firms. These results have important implications for constraining earnings management practices. CEO duality, for instance, is positively related to earnings management only in the case of high-growth firms. This implies that CEOs that also chair a firm's board may become heavily involved in earnings management to ensure that the firm remains attractive; this is not the case for low-growth firms. Institutional shareholding is positively related to earnings management only for low-growth firms and is irrelevant in the case of high-growth firms. The independence of the audit committee is negatively associated with the practice of earnings management for both high-growth and low-growth firms. Thus, an independent audit committee is likely to prove an effective corporate governance mechanism and ensure that financial reports remain neutral.

These results suggest that, in the first instance, the board should formulate procedures to ensure that it has access to a range of information. Second, the audit committee should make certain that the firm's financial statements comply with financial reporting standards. Third, the board should establish an internal audit function to review the firm's risk management, internal auditing, and effectiveness of governance and report on these to the audit committee.

One possible avenue for further research is to examine additional governance attributes such as the age and qualifications of board members and the CEO, the size of the compensation committee, the attendance rate of board meetings, and the knowledge and expertise of board and audit committee members. Based on the new code of corporate governance issued by the Securities and Exchange Commission of Pakistan in 2012, another avenue for research could be to determine whether the effectiveness of corporate governance mechanisms has

improved following the implementation of the new code. Finally, although earlier research suggests that insider shareholding and institutional shareholding reduce earnings management, this study has not found any such evidence. This makes it necessary to examine additional variables such as the interaction between corporate governance attributes and insider shareholding in the presence of long-term institutional investors on the board.

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An RCA Analysis of Textiles and Clothing in Pakistan, India, and Bangladesh

Khurram Shahzad*

Abstract

This study focuses on the revealed comparative advantage analysis for Clothing and Textile sectors of Pakistan, India and Bangladesh. We have applied the Balassa's (1965) Index for the analysis. The revealed comparative advantage has been analyzed in two different ways: one static on the year 2010 and the other one dynamic based on 1980, 1990, 2000 and 2010. For the dynamic analysis, the average of the three previous years from 2010 were taken and used for revealed comparative advantage. The results show Pakistan's highest revealed comparative advantage for textiles over both India and Bangladesh. India has revealed a comparative disadvantage in textile in competition of Pakistan and Bangladesh. For clothing, Bangladesh has very dominant revealed comparative advantage when competing with Pakistan and India. Dynamic revealed comparative advantage indicates Pakistan has been gaining a comparative advantage in textiles since 1980 but with a declining percentage of textile export. Bangladesh has significantly gained a comparative advantage in clothing since the 1980s.

Keywords: Revealed Comparative Advantage, Textile, Clothing, Product Positioning, Balassa Index, Pakistan.

JEL classification: F10, F14, F15, O57.

1. Introduction

Comparative advantage in the production of a commodity implies greater returns to one country relative to the other. Although it can be measured by determining the relative pre-trade prices of the commodity in question, this computation is accompanied by difficulties (Mahmood & Hajji, 2009). Balassa's (1965) concept of revealed comparative advantage (RCA) is, therefore, used extensively to analyze countries' comparative advantage in specific commodities as well as patterns of comparative advantage for commodities over time.

* Lecturer, School of Economics, Minhaj University, Lahore; PhD student, Pakistan Institute of Development Economics, Islamabad, Pakistan.

Studying a country's patterns of trade is crucial in developing its trade policy. The comparative advantage of a particular commodity varies with time and the country's structural variations. This study uses an RCA index to examine the comparative advantage of producing textiles and clothing with respect to Pakistan, India, and Bangladesh. We concentrate on these two sectors for two reasons: first, because they account for a substantial part of the three countries' exports and, second, because very few studies in the literature have focused on textiles and clothing in the context of these countries.

In Pakistan, textiles and clothing comprise 52.5 percent of the country's total exports. For India and Bangladesh, the World Integrated Trade Solution database reports corresponding proportions of 11.3 percent and 88.1 percent, respectively. In studying the comparative advantage of these three countries with respect to textiles and clothing, we conduct a dynamic analysis of the last four decades.

2. Literature Review

Sinanan and Hosein (2012) calculate the RCA for Trinidad and Tobago, using three-digit export data for the period 1991–2008. The study also applies other tools to determine the change in comparative advantage, including Galtonian regressions, Markov chains, transition probability matrices, mobility indices, and Granger causality tests. The results indicate that Trinidad and Tobago should specialize in the export of petroleum products rather than nonenergy commodities.

Mahmood and Hajji (2009) compute the RCA index for Kuwait's nonpetroleum sector, dividing the country's products into six groups based on their RCA values (food, live animals, beverages and tobacco, crude materials, chemicals, and manufactured articles). While manufactured items, machinery, and transport appear to be losing their comparative advantage, other products indicate an improved RCA. The study also analyzes the intertemporal behavior of RCA for the period 1995–2002 and concludes that nonpetroleum products have emerged in response to global competitiveness.

Batra and Khan (2005) carry out an extensive analysis of two-digit sector-level and six-digit commodity-level data (based on the HS classification) for India and China to assess where their comparative advantage lies. The two countries are seen as comparable in terms of economy size, geography, and factor endowments. The study's factor

intensity analysis indicates that both have a greater RCA in manufacturing, while the dynamic RCA analysis shows that India has a greater advantage in agriculture and allied products.

Serin and Civan (2008) examine Turkey's comparative advantage in the EU vis-à-vis Spain, Italy and Greece for the period 1995–2005. Using the RCA and comparative export performance indices, they find that Turkey has a strong comparative advantage in the region's fruit juice and olive oil markets. However, this trend has declined since 2000, which the authors associate with distortions between Turkey and the EU. Additionally, Turkey is found to have a comparative disadvantage in tomato production.

Akhtar, Zakir, and Ghani (2008) study the RCA for Pakistan's footwear industry for the period 2003–06. They show that the industry has moved from a comparative disadvantage to a comparative advantage, and is expected to grow. Hanif and Jafri (2008) construct an RCA index for the country's textiles sector and find that greater access to external finance has a strong, positive impact on the sector's export competitiveness.

Mahmood (2004) analyzes the comparative advantage of Pakistan's nonagriculture sector to determine which products have lost, gained, or maintained their comparative advantage. The RCA index shows that the textiles and clothing sectors have remained consistent over time, but are likely to face serious competition in the wake of trade liberalization, especially from China.

Utkulu and Seymen (2004) use seven different RCA indices to study Turkey's RCA at a sectoral level for the period 1990–2003. Of the 63 product groups they analyze, Turkey has a comparative advantage in only seven: clothing, vegetables and fruits, sugar, honey, tobacco, oil seeds, and textile yarn. All seven indices yield similar results. The study also looks at the impact of the customs union process on comparative advantage and competitiveness.

Fertő and Hubbard (2002) study comparative advantage patterns for the Hungarian agri-food sector during the 1990s. Using EU trade data, they construct four different RCA indices and find that the sector's RCA remains stable over this period.

3. Methodology

We have seen that the literature relies heavily on Balassa's (1965) RCA index. This is calculated by dividing the share of exports of a particular commodity in the country's total exports by the share of exports of that commodity in total world exports. The value of RCA determines the country's comparative advantage or disadvantage for that commodity. A value greater than 1 indicates a comparative advantage and a value smaller than 1 indicates a comparative disadvantage.

The study's dynamic analysis of comparative advantage is based on four product groups, which represent that particular commodity's comparative advantage over time (see Appendix for more details). These product groups are listed below (see Mahmood, 2004; Mahmood & Hajji, 2009):

- *Competitively positioned products* improve consistently over time and have an RCA that is greater than 1 in time *t*.
- *Threatened products* have an RCA that is greater than 1. However, it is inconsistent and deteriorates over time.
- *Emerging products* are expected to gain a comparative advantage in the future. They are further divided into two subcategories based on their RCA:
    - *Tier I products* initially lack a comparative advantage but, over time, move toward gaining a comparative advantage.
    - *Tier II products* have a greater comparative disadvantage than tier I products, but also indicate a potential shift toward comparative advantage over time.
- *Weakly positioned products* have a greater comparative disadvantage in that their comparative advantage deteriorates continuously over time.
    - *Tier I products* have a revealed comparative disadvantage: their comparative advantage declines continuously over time.
    - *Tier II products* have a greater RCA, which does not improve over time.

4. Data

The data for this study is from the World Trade Database under the Standard International Trade Classification (SITC) scheme and spans the years 1980, 1990, 2000, and 2010. Textiles fall under SITC 65, which includes textile yarn, fabrics, and made-up articles. This is further divided into nine categories:

SITC Product Number	Product Category
651	Textile yarn
652	Cotton fabrics, woven (not including narrow or special fabrics)
653	Fabrics, woven, of manmade textiles (not including narrow or special fabrics)
654	Other textile fabrics, woven
655	Knitted or crocheted fabrics (including tubular-knit fabrics, pile fabrics, and openwork fabrics)
656	Tulles, lace, embroidery, ribbon, trimmings, and other small wares
657	Special yarns, special textile fabrics, and related products
658	Made-up articles, wholly or chiefly of textile materials
659	Floor coverings, etc.

Clothing falls under SITC 84 and includes articles of apparel and clothing accessories. These are further divided into eight categories:

SITC Product Number	Product Category
841	Not knitted or crocheted: men's/boys' coats, capes, jackets, suits, blazers, trousers, shorts, and shirts
842	Not knitted or crocheted: women's/girls' coats, capes, jackets, suits, trousers, shorts, shirts, dresses, and skirts
843	Knitted or crocheted: men's/boys' coats, capes, jackets, suits, blazers, trousers, shorts, and shirts
844	Knitted or crocheted: women's/girls' coats, capes, jackets, suits, trousers, shorts, shirts, dresses, and skirts
845	Articles of apparel, of textile fabrics, whether or not knitted or crocheted
846	Clothing accessories, of textile fabrics, whether or not knitted or crocheted (other than those for infants)
848	Articles of apparel and clothing accessories of other than textile fabrics; headgear of all materials

5. Analysis and Interpretation of Results

This section calculates the RCA for Pakistan, India, and Bangladesh and then conducts a dynamic RCA analysis for the three countries. Table 1 gives the RCA values for textiles and clothing for 2010. Pakistan has the highest RCA for textiles (22.26) while India has the lowest (3.44). This implies that Pakistan has the strongest comparative advantage in producing textiles relative to the other two countries in the year 2010.

Table 1: RCA for textiles and clothing, 2010

Country	RCA for textiles	RCA for clothing
Pakistan	22.26	7.98
India	3.44	2.16
Bangladesh	3.99	35.46

Source: Author's calculations.

Bangladesh has the highest RCA for clothing (35.46), followed by Pakistan (7.98) and India (2.16). Clearly, Bangladesh has a strong comparative advantage in the production of clothing compared to Pakistan and India, while Pakistan has a comparative advantage over India. While all three countries have a comparative advantage in this product category, Bangladesh has a very strong RCA over the other two. Moreover, in both cases (textiles and clothing), India has a revealed comparative disadvantage relative to Pakistan.

The dynamic RCA analysis for the selected countries is from decade to decade, using the first year of each decade (1980, 1990, 2000, and 2010). Table 2 gives the dynamic RCA for Pakistan, India, and Bangladesh along with their respective shares of textiles and clothing as a percentage of total merchandise.

The RCA for textiles in Pakistan's case increased between 1980 (12.38) and 2010 (22.26). Textile exports accounted for almost 33.5 percent of total merchandise exported in 1980, with this share increasing to 36.7 percent in 2010 and reaching 50.2 percent in 2000. Although textiles register a consistent rise in RCA, the sector's percentage share of exports has declined from 50.2 percent in 2000 to about 36.7 percent in 2010.

This decline could be due to the energy crisis Pakistan has faced since 2007, where the electricity shortfall has been responsible for slowing

down growth in Pakistan's manufacturing sector while the unavailability of gas in winter has lowered production levels in the textiles sector. Poor governance may also account for the lack of effective policies for the textiles sector.

Table 2: Dynamic RCA analysis

Country	Division	1980	1990	2000	2010
Pakistan	RCA for textiles	12.38	15.67	20.93	22.26
	% Share of textiles in total merchandise	33.48	47.42	50.20	36.66
	RCA for clothing	1.98	5.76	7.75	7.98
	% Share of clothing in total merchandise	3.95	18.05	23.75	18.35
India	RCA for textiles	5.63	4.10	5.50	3.44
	% Share of textiles in total merchandise	15.21	12.13	13.20	5.67
	RCA for clothing	3.93	4.50	4.60	2.16
	% Share of clothing in total merchandise	7.84	14.08	14.07	4.96
Bangladesh	RCA for textiles	20.19	6.78	2.56	3.99
	% Share of textiles in total merchandise	54.58	20.51	6.15	6.58
	RCA for clothing	0.11	12.27	25.88	35.46
	% Share of clothing in total merchandise	0.22	38.48	79.30	81.59

Source: Author's calculations.

India's RCA values for both textiles and clothing decrease over time. The RCA for textiles was a little over 5.6 in 1980 and declined to just over 3.4 in 2010. The share of textile exports fell from 15.2 percent in 1980 to just under 5.7 percent in 2010. The RCA for clothing was a little over 3.9 in 1980 and fell below 2.2 in 2010. The share of clothing exports was over 7.8 percent in 1980, but declined to less than 5 percent in 2010. Overall, the dynamic RCA analysis does not give a promising picture of India's textiles and clothing sectors, where the exports of both have declined continuously over time.

The data for Bangladesh shows a decline in the RCA for textiles from 1980 (20.19) to 2010 (3.99), reflecting a decline in the country's comparative advantage in this sector. Textile exports accounted for almost 54.6 percent of total merchandise exported to the world in 1980, but this share had fallen significantly by 2010 to just under 6.6 percent.

On the other hand, Bangladesh appears to have performed very well in the clothing sector from 1980 to 2010, which is likely associated with its decision to pursue export-oriented rather than import-substitution industrialization. The country's strategy has focused specifically on the

readymade garments sector (which, in this study, falls under clothing). Its share of textile exports has, however, declined as a probable result of constant flooding and a decline in world demand (see Spinanger, 1987).

Bangladesh registers a negligible RCA for clothing in 1980 (0.11), where the sector accounts for just over 0.2 percent of total merchandise exported. However, the country's revealed comparative disadvantage improves significantly over time and, by 2010, its RCA has risen to 35.46 and its share of exports to almost 81.6 percent (Table 2).

Figures 1 and 2 plot the RCA for clothing and textiles, respectively, for Pakistan, India, and Bangladesh, enabling a comparison between the two product groups. Figures 3 and 4 plot the respective shares of clothing and textiles for these countries over the decades.

Figure 1: RCA for clothing, 1980–2010

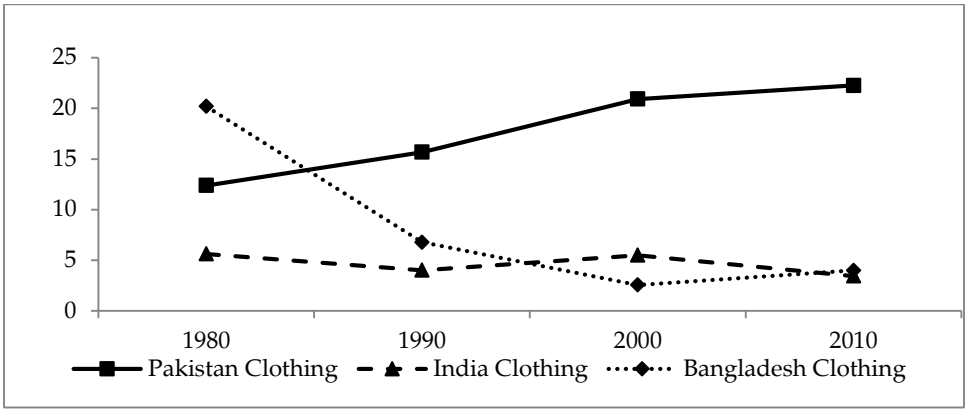


Figure 2: RCA for textiles, 1980–2010

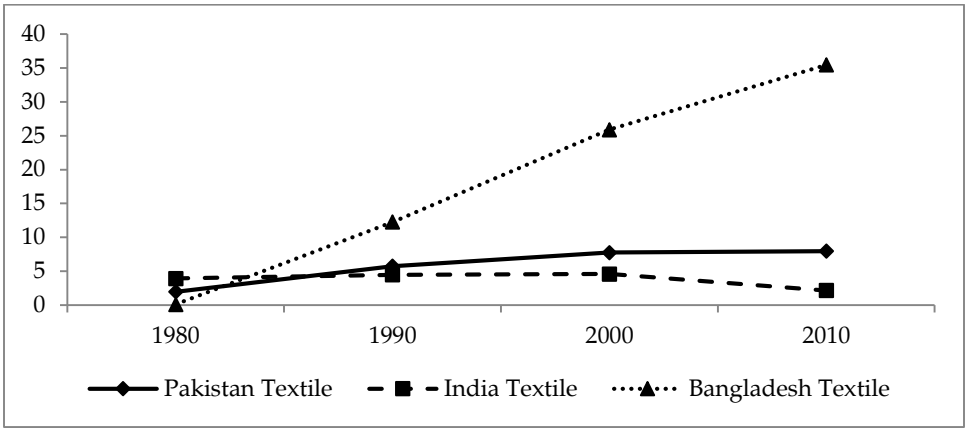


Figure 3: Share of clothing in total merchandise

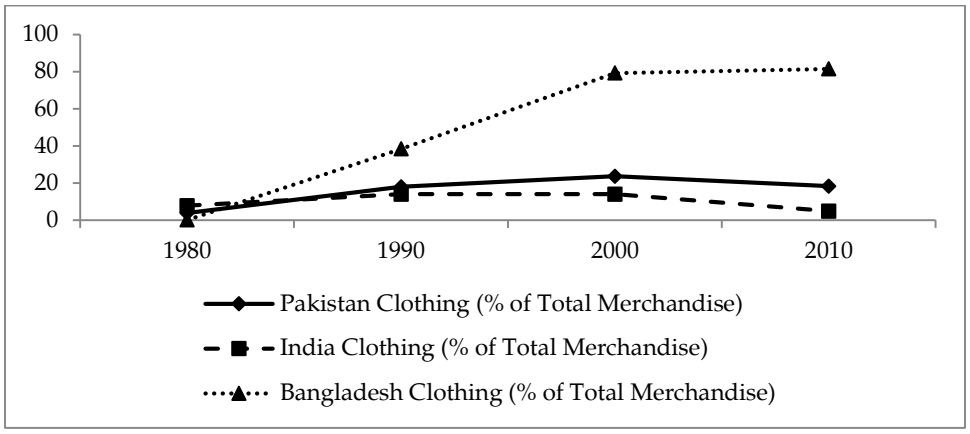
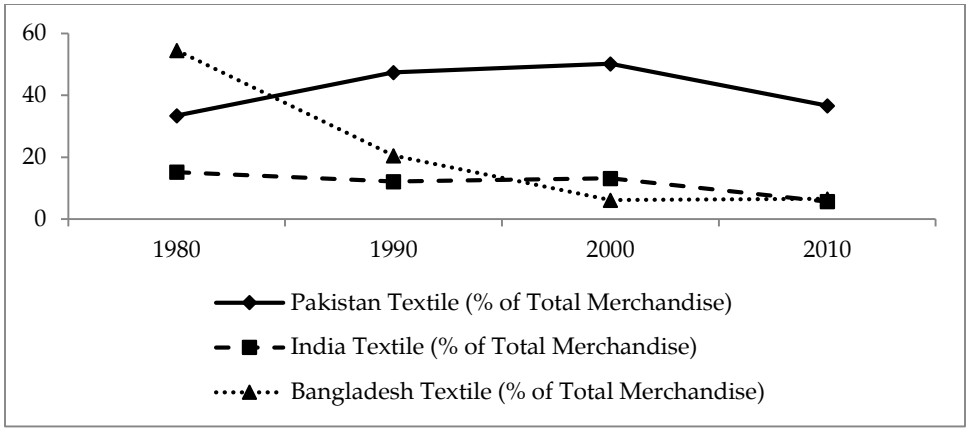


Figure 4: Share of textiles in total merchandise



Pakistan's RCA for textiles in 2010 is 22.26, indicating a difference of –0.89 from the corresponding previous three-year average (Table 3). Thus, although their RCA value is greater than 1, textiles are classified as threatened products because the value does not improve over time. Moreover, the percentage share of textile exports in total merchandise has declined between 2000 and 2010. Clothing follows a similar trend. Its RCA is also greater than 1, but the difference in values between 2010 and the previous three-year average is –0.28. This demonstrates that, over time, clothing in Pakistan has become a threatened product group.

Both Indian textiles and clothing qualify as threatened product groups with an RCA greater than 1, but a negative value for the

difference between the RCA for 2010 and the corresponding previous three-year average (–0.05 and –0.52 for textiles and clothing, respectively).

In the case of Bangladeshi textiles, the difference between the RCA for 2010 and the previous three-year average is –0.08 (the RCA is still greater than 1). Again, this brings the sector within the threatened products category. The clothing sector presents a different case, however, and remains strongly competitive relative to Pakistan and India. The RCA for clothing is 35.46 and the difference between the RCA for 2010 and the corresponding previous three-year average is 4.19 (greater than 0). This implies that the product group enjoys a strong competitive position in the international market.

Table 3: Difference between RCA values

Country	Division	RCA 2010 – RCA ($\sum_{i=2007}^{2009} xi/3$)
Pakistan	Textiles	-0.89
	Clothing	-0.28
India	Textiles	-0.05
	Clothing	-0.52
Bangladesh	Textiles	-0.08
	Clothing	4.19

Source: Author's calculations.

6. Conclusion

The study's static and dynamic analyses of textiles and clothing for the selected countries reveal that Pakistan has a comparative advantage in both product groups, but a revealed corporative advantage in textiles. However, neither group has improved over time and are thus both classified as threatened products. India fares worst with a smaller RCA in both textiles and clothing relative to Pakistan and Bangladesh over time. Both product groups are classified as threatened products. Finally, textiles in Bangladesh fall under the threatened products category, but the country's clothing sector has improved significantly in terms of RCA.

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Appendix

Product positioning	**Restrictions**
Competitively positioned products	• $\mathrm{RCA}_t^i > 1$ • $\mathrm{RCA}_t^i - \mathrm{RCA}^i_{average\ of\ previous\ three\ years\ from\ t} > 0$
Threatened products	• $\mathrm{RCA}_t^i > 1$ • $\mathrm{RCA}_t^i - \mathrm{RCA}^i_{average\ of\ previous\ three\ years\ from\ t} < 0$
Emerging products	Tier I • $\mathrm{RCA}_t^i < 1$ • $\mathrm{RCA}_t^i \geq 0.5$ • $\mathrm{RCA}_t^i - \mathrm{RCA}^i_{average\ of\ previous\ three\ years\ from\ t} > 0$ Tier II • $\mathrm{RCA}_t^i < 0.5$ • $\mathrm{RCA}_t^i - \mathrm{RCA}^i_{average\ of\ previous\ three\ years\ from\ t} > 0$
Weakly positioned products	Tier I • $\mathrm{RCA}_t^i < 1$ • $\mathrm{RCA}_t^i \geq 0.5$ • $\mathrm{RCA}_t^i - \mathrm{RCA}^i_{average\ of\ previous\ three\ years\ from\ t} < 0$ Tier II • $\mathrm{RCA}_t^i < 0.5$ • $\mathrm{RCA}_t^i - \mathrm{RCA}^i_{average\ of\ previous\ three\ years\ from\ t} < 0$

Notes for Authors

1. Manuscripts will be accepted for consideration on the understanding that they are original contributions to the existing knowledge in the fields of Economics, Banking, Current Affairs, Finance, Political Economy, Sociology, and Economic History.

2. Electronic copies of research articles, research notes, and book reviews – in English only – should be **submitted as an email attachment to: nina@lahoreschool.edu.pk and nina_lse@yahoo.com. Upon receipt, a confirmation email will be sent to the corresponding author containing a serial number identifying the article.**

3. The first page of the manuscript should have the title of the paper, the names(s) of author(s), and a footnote giving the current affiliation of the author(s) and any acknowledgments

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