Sectoral Analysis of Employment Demand

(Jobless growth) in Pakistan

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Abstract

A new tale for the global world and a buzz word of 21st century "jobless growth" is a main area under discussion of this study. This paper investigates the relationship between employment and economic growth in seven sectors of the Pakistan economy. The main focus of the analysis is to assess if the economic growth in that sector has been jobless over the past 3 decades. The issue is important for many developing countries where recent changes in the use of capital – based foreign technology has resulted in substitution of labour with non-labour inputs such as capital. I develop an augmented employment demand equation in which employment is expressed as a function of output (GDP). The equation is estimated using pooled data for the period 1974 – 2008 and estimates the threshold level of economic growth for seven sectors of Pakistan economy. Tests of stationarity and co-integration are performed. Results indicate that jobless growth exists only in the manufacturing sector of Pakistan economy and that sector required a high threshold level of economic growth. Policy implications of results are also discussed.

Key Words: Pakistan, Employment, Economic growth, Jobless growth

JEL Classification: J21, J23, J24

Introduction

A new tale for the global world and a buzz word of 21st century "jobless growth" is a main area under discussion of this study. This paper investigates the relationship between employment and economic growth in seven sectors of the Pakistan economy. The main focus of the analysis is to assess if the economic growth in that sectors has been jobless over the past 3 decades. The issue is important for many developing countries where recent changes in the use of capital – based foreign technology has resulted in substitution of labour with non-labour inputs such as capital.

Jobless growth can be defined in two broad ways. First, a jobless growth may refer to a situation whereby the overall economy is growing, but the absolute employment level is stagnant or falling, rendering near-zero or negative employment growth rates. Second, the term may be used to describe a situation whereby the overall economy is growing, while the rate of unemployment is rising (Altman 2003: 12). These two definitions respectively represent a very strict and a very broad interpretation of the term, with the latter not preventing or stopping an increase in the number of employed individuals.

The issue of jobless growth in developing countries is important because efforts to fight wide-spread poverty levels are destined to fail unless jobs are created for the many unemployed and poor. As Fields (2004) points out "poor are poor because they earn little from the work they do". And if growth does not produce high-productivity and high-paying jobs, its purpose to foster development and alleviate poverty, will eventually be defeated. However, recent data on developing countries indicate a weakening of the relationship between employment and economic growth (Rada, 2008).

In previous study (Haider, 2009)[2] , an econometric investigation of the issue of jobless growth in Pakistan was conducted using national data. It was concluded that economic growth in Pakistan has been jobless over the past three decades. The present study extends the same analysis using separate data on seven sectors of Pakistan's economy. Such an extension is important for at least three reasons. First, the analysis of previous study was based on an estimate of the elasticity of employment with respect to growth in national output (GDP), using an aggregate national data. However, estimation of employment elasticity using aggregate national data may be unreliable in a developing country due to the presence of a large unorganized sector. According to Government of Pakistan (2007-08), about 70 percent of employed labour force in Pakistan works in the unorganized sector. Hence, any conclusions regarding the jobless nature of economic growth based on national data analysis may be misleading. Under this circumstance, some economists, such as Islam (2004), have suggested to estimate employment elasticities using data on individual sectors. Second, as has been the case of many developing and developed countries, Pakistan's economy has also experienced a structural shift as employment shifted from agriculture towards manufacturing and then towards the service sector. During 2007-08, service sector accounted for most of the national output, with its GDP comprising about 53 percent of national GDP (Table 1). It has been argued by some in theoretical and empirical development economics literature, that growth in service sector is largely jobless (for example, Joshi, 2004; Ros, 2000). Hence, reliance of a growth policy on service sector to generate employment so that the benefits of growth are shared by a large section of the society will be inappropriate. The present study will be the first to investigate if the switch towards services sector in Pakistan was indeed the source of Pakistan's overall jobless growth, as was concluded in the previous study.

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Third, an estimation of employment elasticity for each sector of the economy can suggest which sector of the economy needs more focus if the overall (national) response of employment to economic growth is to be enhanced[3].

Table 1: Sectoral Shares of GDP and Employment in Pakistan (1950-2008, %)

Sector	Share	1950	1960	1970	1980	1990	2000	2008
Agriculture	**GDP**	**53.2**	**45.8**	**38.9**	**30.6**	**25.8**	**25.9**	**21.3**
	Employment	**-**	**60.47**	**57.03**	**52.65**	**51.15**	**48.42**	**44.65**
Industry	**GDP**	**9.6**	**15.5**	**22.7**	**25.6**	**25.6**	**23.3**	**24.3**
	Employment	**-**	**15.39**	**19.91**	**20.32**	**19.81**	**18.03**	**20.1**
Manufacturing	GDP	8	12.4	16.5	17.5	18.1	17	20.7
	Employment	-	13.6	15.57	14.66	12.84	11.55	13.11
Construction	GDP	1.4	2.5	4.2	5.1	4.1	2.5	2.1
	Employment	-	1.44	3.93	4.92	6.38	5.78	6.29
Electricity	GDP	0.2	0.5	2	3	3.3	3.9	1.4
	Employment	-	0.35	0.41	0.74	0.59	0.7	0.7
Services	**GDP**	**37.2**	**38.7**	**38.4**	**43.8**	**48.6**	**50.7**	**53.8**
	Employment	**-**	**24.14**	**23.06**	**27.04**	**29.04**	**33.55**	**35.25**
Transport	GDP	5	5.7	6.3	6.8	9.5	11.7	10.3
	Employment	-	2.04	4.73	4.73	4.89	5.03	5.46
Trade &finance	GDP	12.3	13.5	15.6	16.8	18.8	21.2	23.7
	Employment	-	7.6	9.89	11.94	11.93	13.5	14.62
All other services	GDP	19.8	19.6	16.5	20.3	20.4	18.3	19.9
	Employment	-	14.5	8.44	10.37	12.22	15.02	15.17

Source: Various Issues of Labour Force Survey and Economic Survey of Pakistan.

In Pakistan, hours worked per week by employees vary widely by sectors. In some sectors (transport and trade &finance) total number of hours worked per week is above 50 hours. On the other end, a considerable proportion (28 percent) worked 56 hours or more a week (All

[3] A simple illustration may be useful in indicating the magnitude of employment elasticity (and output growth) that may be desirable for an economy in order to quickly absorb its surplus labour. With a labour force growth of 2.5 per cent per annum and an overall employment elasticity of 0.4, a GDP growth of 6 per cent would be required merely to absorb the annual additions to the labour force. And in order to have an employment growth so as to enable the economy to absorb its unemployed and surplus labour, the required GDP growth would be of the order of 7 per cent. On the other hand, if this hypothetical economy could achieve a high growth of it's more labour intensive sectors (e.g., labour intensive manufacturers, construction, and services), the overall employment elasticity could perhaps be raised (say, to 0.6) and a lower GDP growth (say, of six per cent) could enable it to achieve the same objective (viz., the absorption of surplus labour in modern sectors) (Islam, 2004.p.5)

sectors). About 14 percent of the employed persons worked less, while 86 percent more, than "35 hours a week"- the duration representing full (time related) employment. Some broad averages by sectors are provided in Table 2.

Table 2: Sectoral Hours Worked Per Week in Pakistan (Averages, 1974 to -2008)

Sector	1974	1980	1990	2000	2008
Agriculture	46.75	46.19	43.36	45.14	40.69
Manufacturing	45.24	46.56	47.32	46.81	47.95
Construction	45.67	46.98	45.70	44.28	46.24
Electricity	46.68	47.33	45.88	43.82	45.03
Transport	47.63	49.10	49.41	51.37	52.95
Trade &finance	48.41	48.41	47.57	48.71	51.12
All other services	46.17	46.51	45.72	44.30	47.66
Total Pakistan Economy	46.87	46.64	45.14	46.28	45.12

Source: 50 years of Pakistan in Statistics Volume-II (1947-1997) and Labour Force Survey (various issues).

The next Section, Section 2, presents an augmented employment demand equation that will be estimated using sectoral data for the economy of Pakistan. The sectoral data are analyzed for the period 1973-74 to 2007-08 and have been arranged in a pooled form to estimate the employment demand equation. Section 3 discusses the econometric issues involved in the estimation of pooled data. Econometric results are interpreted in Section 4 which also discusses the employment elasticity in each sector based on which threshold growth of GDP is obtained for each sector. Sections 5 summarize the results, policy implications and some interesting area for future research.

2: Augmented Employment Demand Equation Showing Sectoral Effects

The final employment demand equation that was estimated in the previous paper (Haider, 2009) to obtain national elasticity of employment demand with respect to GDP for each sector is re-written below:

$$lnE_t = \beta_0 + \beta_1 \ln X_t + \beta_2 \ln H_t + \beta_3 \ln POP_t + \beta_4 t + \varepsilon_t \qquad (1)$$

In the present study, sectoral time series data are obtained to estimate the above equation. Seven sectors of the economy are considered, including: Agriculture, Manufacturing, Construction, Electricity, Transport, Trade & Finance and All other services.[4] Data are organized in a pooled form giving rise to 245 observations. The employment demand equation with sector dummy variables, Di, is written below:

$$lnE_{it} = \beta_0 + \beta_1 \ln X_{it} + \beta_2 \sum_{i=1}^{6} (\ln X_{it} * D_{it}) + \beta_3 \ln POP_{it} + \beta_4 \ln H_{it} + \beta_5 \sum_{i=1}^{6} (\ln H_{it} * D_{it}) + \beta_6 t + \varepsilon_{it} \qquad (2)$$

where i represents 6 sectors as defined above,

In the above equation (2), the dummy variable (Di) takes on a value of 1 for sector i and zero otherwise. The dummy variable is interacted with each of the variables in the basic model. This interaction allows a direct test of significance of the differential impact of each variable on employment demand in relation to the base, or the seventh, sector. Agriculture sector is used as the base sector. Although overtime, employment has shifted in Pakistan away from the

[4] The grouping of sectors was based on data availability. A detailed list of the composition of each sector is provided in Appendix, Table A1.

agriculture sector, it still remains the major employer, with about half of the employed labour force working there.

3: Econometric Issues Relating to Estimations Based on Pooled Data

Pooled data consist of a time series for each cross-sectional unit in the data e.g. data regarding GDP and employment of different sectors in the economy over a number of years.[5]

The use of pooled data in econometric estimation gives rise to the issues of data stationarity, autocorrelation, and heteroscedasitcity. Stationarity issue arises because of the time series component as the variance of the time series data and their mean may not be constant over time. Autocorrelation issue, also arising in time series data, arises if successive error terms are correlated. Heteroscedasticity issue arises because of the cross sectional component of pooled data as the variance of each error term, conditional upon the chosen value of the explanatory variables, may not be constant (Gujarati, 2002). These two issues render the OLS estimations biased and inefficient. The following two sections explain how stationarity of data and heteroscedasticity will be tested and addressed in this study.

3.1: Stationarity of data

Estimations based on pooled data require that the data should be stationary.[6] If the data are not stationary, then estimation results may be spurious, in which case the standard t and F tests will not be valid, and hence any conclusions based on such estimations will also be invalid. To test for the presence of stationarity, econometrics literature provides different tests such as,

[5] See details on pooled data , Gujrati ,2006

[6] "A stochastic process is said to be stationary if its mean and variance are constant over time and the value of covariance between two time periods depends only on the distance or lag between the two time periods and not on the actual time at which the covariance is computed." (Gujarati, 2006, p.496)

graphical, correllogram and unit root tests of stationarity. Testing for unit roots in time series data has now become a common practice in empirical studies. Different tests of unit roots have been proposed in recent econometric literature, for example, Levin, Lin and Chu (2002); Im, Pesaran and Shin (IPS, 2003); Breitung (2000); Fisher type tests using ADF and PP tests (Maddala and Wu, 1999, Choi, 2001, and Hadri, 2000).[7] In these six tests, some provides a common root, such as the Levin, Lin and Chu test; and Breitung and Hadri test.[8] While others provide an individual root, such as, Im, Pesaran and Shin test; and Fisher type tests using ADF and PP tests (Maddala, 1999 and Choi, 2001).[9] For the purpose of this study, the IPS test is more valid, because it tests for the overall stationarity of data as well as for the stationarity of each cross section series. A brief description of IPS test follows.

Suppose a unit root test is to be performed on a series $X_{i,t}$ where i denotes cross sectional unit and t denotes the time. The following equation will be estimated.

$$\Delta X_{i,t} = \rho_i X_{i,t-1} + \sum_{j=1}^{\theta_i} \delta_{ij} \Delta X_{i,t-j} + \alpha_i + \varphi_i T + U_{it}$$

Where θ_i is the lag length, $\varphi_i T$ is the vector of deterministic variables (intercept and trend) and α_i is the vector of corresponding coefficients (fixed effect). The null and alternative hypotheses are formulated as:

H0: $\rho_i = 0$ for all i

[7] For a detail discussion on Unit root tests see Wooldridge (2002) and Baltagi (2008).
[8] Common root indicates that tests are estimated assuming a common autoregressive (AR) structure for all of the series in a pooled.
[9] Individual root is used for tests which allow for different autoregressive (AR) coefficients in each series of the pooled.

H1: $\rho_i < 0$ for at least one i

Thus, the null hypothesis of this test is that each cross-sectional data are non- stationary in the pool under the alternative hypothesis that some of the series in the pool are stationary. The IPS t-bar statistic is defined as the average of the individual ADF statistics as:

$$\bar{t} = \frac{1}{N}\sum_{i=1}^{N} t_{\rho_i}$$

The critical values (simulation) of $\bar{t}$ were provided by IPS (2003) for different numbers of cross sections, series lengths, and for test equations containing either intercepts, or intercepts and linear trends. More detailed discussion on IPS can be found in M.H. Pesaran (2003).

Stationarity Test for Pakistani Data, Unit Root Test

As discussed in the econometrics issues section, there are several tests in econometrics literature available to check the stationarity of data in pooled estimation. For the purpose of this study, the Im, Pesaran and Shin (IPS) test is more valid which tests for the overall stationarity of data, and also for each cross section unit. Results of IPS test are provided in Table 3.

Table 3: Unit Root Test for Employment, GDP and Total Number of Hours Worked Per Week

Im, Pesaran and Shin (IPS)	Employment							
	Level				1st difference			
	Intercept		Intercept &Trend		Intercept		Intercept &Trend	
Cross sections	Statistics	Prob	Statistics	Prob	Statistics	Prob	Statistics	Prob
Agriculture	0.3833	0.9789	-3.1968***	0.1030	-4.5872*	0.0009	-4.5637*	0.0051
Manufacturing	-2.1173	0.2394	-3.1903***	0.1033	-5.0762*	0.0002	-5.0205*	0.0016
Construction	-1.1507	0.6835	-2.1451	0.5034	-6.8064*	0.0000	-6.7426*	0.0000
Electricity	-6.9106*	0.0000	-4.4814*	0.0073	-5.6091*	0.0001	-5.6879*	0.0003
Transport	0.4925	0.9836	-5.7098*	0.0002	-4.5943*	0.0010	-4.5971*	0.0049
Trade &finance	0.4944	0.9838	-3.4772**	0.0591	-5.7551*	0.0000	-5.7196*	0.0003
All other services	0.4628	0.9820	-2.0066	0.5717	-6.5476*	0.0000	-6.0412*	0.0002
Overall Unit root	0.72681	0.7663	-4.07946*	0.0000	-11.5930*	0.0000	-10.1431*	0.0000
Im, Pesaran and Shin (IPS)	**GDP@**							
	Level				1st difference			
	Intercept		Intercept &Trend		Intercept		Intercept &Trend	
Cross sections	Statistics	Prob	Statistics	Prob	Statistics	Prob	Statistic	Prob
Agriculture	-0.5455	0.8697	-2.5308	0.3123	-7.1211*	0.0000	-7.0919*	0.0000
Manufacturing	-0.3907	0.8992	-2.3809	0.3815	-2.859***	0.0615	-2.7757	0.2158
Construction	-1.9597	0.3023	-2.5476	0.3049	-4.5025*	0.0011	-2.8312*	0.1995
Electricity	-1.5420	0.5006	-0.1667	0.9913	-5.2016*	0.0002	-5.7358*	0.0002
Transport	-1.8597	0.3465	-1.3559	0.8558	-5.2027*	0.0002	-5.5456*	0.0004
Trade &finance	0.0088	0.9530	-1.6634	0.7454	-4.8005*	0.0005	-4.7162*	0.0034
All other services	-1.9993	0.2858	-2.4748	0.3377	-6.3837*	0.0000	-6.3551*	0.0000
Overall Unit root	0.98077	0.8366	0.82279	0.7947	-10.7682*	0.0000	-8.7656*	0.0000
Im, Pesaran and Shin (IPS)	**HOURS**							
	Level				1st difference			
	Intercept		Intercept &Trend		Intercept		Intercept &Trend	
Cross sections	Statistics	Prob	Statistics	Prob	Statistics	Prob	Statistics	Prob
Agriculture	-1.0849	0.7095	-1.9714	0.5927	-3.2601**	0.0258	-3.198***	0.1032
Manufacturing	-3.7833*	0.0070	-4.6181*	0.0040	-4.8932*	0.0004	-4.7936*	0.0031
Construction	-1.1431	0.6862	-4.3002*	0.0089	-6.1293*	0.0000	-6.0135*	0.0001
Electricity	-1.1563	0.6773	-4.5721*	0.0045	-3.5457**	0.0146	-3.364***	0.0784
Transport	-1.5707	0.4863	-4.5944*	0.0043	-10.198*	0.0000	-10.113*	0.0000
Trade &finance	0.2340	0.9707	-0.8601	0.9489	-8.6358*	0.0000	-9.1655*	0.0000
All other services	-1.4664	0.5355	-3.5782**	0.0496	-3.2890**	0.0252	-3.354***	0.0783
Overall Unit root	0.02448	0.5098	-4.2296*	0.0000	-11.8649*	0.0000	-10.6643*	0.0000

(*, **, ***) means statistically significant at 1, 5, and 10 percent levels of significance, respectively. Hence, the series are considered stationary. Employment and hours worked per week data are stationary at I (0), while the GDP data are stationary at I (1). @GDP data are stationary at I(0) according to Levin ,Lin and Chu test (Test statistics: -2.02349 & Probability value is 0.0215).

The IPS unit root test shows the employment data in all sectors have different levels of stationarity. The data on employment are trend stationary at level but in each sector it is stationary at first difference and also stationary at first difference with intercept. GDP data are stationary at first difference in each sector and also in the overall pooled data. The data on total number of hours worked per week are stationary at level, except in agriculture and trade &finance sectors. In the overall pooled data, this variable is stationary at level.

In summary, the IPS test results show that in pooled data, employment and number of hours per week data are trend stationary at level but also stationary at first difference at intercept and GDP data are stationary at first difference. To account for the non-stationarity of GDP data, a residual based co-integration ADF test will be performed after the econometric estimation in the next Section. This test will indicate whether econometric results are spurious.

3.2: Heteroscedasticity and Autocorrelation

The problem of heteroscedasticity arises in the cross section component of pooled data if the variance of each error term, conditional upon the chosen value of the explanatory variables, is not constant (Gujarati, 2002). On the other hand, successive correlation between time series observations gives rise to the problem of autocorrelation.[10] In the presence of these two econometric problems, the estimates are inefficient although they still are best, linear and unbiased (Gujarati 2002).To correct for the inefficiency due to the presence of heteroscedasticity and autocorrelation, Newey-West Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors method can be applied.[11] This method corrects for the wrong standard errors and t values obtained in the presence of heteroscedasticity and autocorrelation. This method applies to

[10] Kendall and Buckland, (1971)
[11] Newey and West (1987)

relatively large sample sizes i.e. say having 50 or more observations (Gujarati 2002). In our case, sample size has more than 50 observations; therefore the HAC estimation by Newey-West is applied to econometric estimation of pooled data analysis.

4: Econometric Results of the Augmented Employment Demand Equation

The augmented employment demand equation (equation 1) was estimated with pooled data. The Feasible Generalized Least Square (FGLS) method was used as it corrects for heteroscedasitcity, present due to cross section component of data, and any contemporaneous correlation that may be present due to time series component of the data. For robust variance, the methodology of Beck and Katz (1995), which is also called a Panel Corrected Standard Error (PCSE), is used.[12]

Table 4 provides econometric results of employment demand equation using the FGLS approach.

[12] According to Gujarati (2006), panel data are a special type of pooled data, which are also called longitudinal data or micro panel data, in which the same cross sectional unit, for example a family or a firm, is surveyed over time. All tests applicable to panel data are also applicable to the general form of pooled data.

Table 4: Econometric Results of Employment Demand Equation: FGLS Estimates

Variable	*Coefficient*	*t-statistic*	*P-value*
Constant	3.371023	3.066692	0.0024
GDP (X_t)	-0.07635	-1.77954	0.0765
Hours (H_t)	0.635056	3.161675	0.0018
Population (Pop_t)	-0.58049	-4.45186	0.0000
Time (t)	0.037442	11.04457	0.0000
Interaction variables *(Base sector is agriculture)**			
GDP(Mining & Manufacturing)	0.105492	1.970137	0.0500
GDP(Construction)	0.565023	16.32795	0.0000
GDP(Electricity)	0.287625	3.07024	0.0024
GDP(Transport)	0.244561	5.650384	0.0000
GDP(Trade &Finance)	0.285162	7.381531	0.0000
GDP(All other Services)	0.372586	7.561574	0.0000
Hours (Mining & Manufacturing)	-0.72916	-3.9752	0.0001
Hours (Construction)	-2.29621	-20.6644	0.0000
Hours (Electricity)	-2.00685	-7.12157	0.0000
Hours (Transport)	-1.39097	-9.55886	0.0000
Hours (Trade &Finance)	-1.32689	-9.97152	0.0000
Hours (All other Services)	-1.62049	-9.57022	0.0000
R^2	0.983237		
No of Observations	245		

*The interaction variable in a sector is the product of its dummy variable with the corresponding variable (GDP and hours worked per week). All variables, except for the time trend variable, are entered in log form.

Before interpreting the econometric results, we address the concern that the non-stationarity of the data may result in spurious or meaningless regression outcomes. A residual based co- integration test was applied. Its results using ADF are provided in Table 5. If residuals of the employment demand model are found to be stationary, the series are co-integrated and results are not spurious.

Table 5: Residuals Based Co-Integration Test Results (ADF)

		t-Statistic	Prob.
Augmented Dickey-Fuller test statistic		**-11.14020**	**0.0000**
*Test critical values:**	*1% level*	*-5.6532*	
	5% level	*-4.8601*	
	10% level	*-4.4749*	

* The Null hypothesis indicates non-co-integration. The critical values are calculated by using the software provided by James G. MacKinnon http://www.econ.queensu.ca/faculty/mackinnon/jbes/. See MacKinnon (1994

The above co-integration test result shows that residuals of the estimated regression, i.e., the employment demand model for sectoral analysis, are stationary in their levels, i.e, I (0). Hence, a linear combination of the series is co-integrated indicating that the econometric results of the employment demand model are meaningful and variables of the model are co-integrated in the long run. We now turn to the interpretation of the econometric results which were reported in Table 4.

The high value of R-square suggests that the regression model is a good fit. Values of t-statistics suggest that all coefficients are statistically significantly different from zero. This is true for most variables at 0.05 percent level of significance, but for the GDP variable it is true at 0.10 percent level of significance. Since all variables are entered in log form, except for the time trend variable, the coefficient of each variable is the elasticity of employment with respect to the corresponding variable. Coefficients of interaction variables measure by how much the elasticity in each sector differs from that in the base sector which, as before, is the base sector. All such

coefficients are statistically significantly different from zero indicating a statistically significant difference between the elasticity of employment in each sector from that in agriculture sector.

In each of the included sector, the elasticity of employment demand with respect to GDP is higher than in agriculture. However, the opposite is true in all sectors when one compares employment elasticity with respect to hours worked per week in each sector, with agriculture. Since the absolute values of the negative coefficients of each dummy interaction variable with hours are higher than the positive elasticity in agriculture, they all have negative employment demand elasticities with respect to hours. This result perhaps indicates that employers in those sectors substitute between the number of workers and their working hours, but not so in agriculture.

The main elasticity of interest in this study is the elasticity of employment demand with respect to GDP. Based on the results of Table 4, this elasticity value is computed for each sector and presented in Table 6.

Table 6: Sector Wise Elasticities of Employment with respect to GDP in Pakistan

Sectors	Elasticity
Agriculture	-0.076
Mining &Manufacturing	0.029
Construction	0.488
Electricity	0.211
Transport	0.168
Trade &finance	0.208
All other services	0.296

Source: Based on Table 4 Each sector's elasticity is obtained by adding the coefficient of its dummy interaction variable with GDP to the coefficient of GDP variable.

As Table 6 results indicate, the agriculture sector has a negative elasticity of employment demand with respect to GDP.[13] A one percent output growth in agriculture causes a negative employment growth in agriculture of 7.6 percent. In other words, employment demand in agriculture sector of Pakistan drops when its output grows. A possible reason for this result could be the presence of surplus labour in agriculture sector which has resulted in a negative marginal product of labour in this sector.[14] Future research can investigate this issue in more detail.[15]

The elasticity of employment demand with respect to GDP is positive in all non-agricultural sectors. Hence, output growth in non-agricultural sector does help increase employment. The strongest response of employment to output growth is found in the construction sector, while it is the least in the mining and manufacturing sectors combined.[16]

Given the above estimates of employment demand elasticities, it is clear that for employment generation, public policy in Pakistan can rely upon economic growth in only non-agriculture sectors of the economy. However, how much output growth is needed in each sector before it begins to employ additional workers? To answer this question, one must calculate the "threshold" levels of GDP growth for each sector. Results of this calculation are provided in

[13] That means higher GDP will lead to lower agricultural employment. This, in essence, is in line with the structural change theory proposed by Chenery and Syrquin (1975) which suggests that increases in agricultural GDP will have two counteracting influences on agricultural employment. On the one hand, the expansion of the agricultural sector will boost employment in that sector, but on the other hand, the expansion of the economy as a whole could also decrease agricultural employment as workers reallocate their services to non-agricultural activities.

[14] The surplus labour appears to have pushed agriculture production to the inefficient third stage of production.

[15] Kapsos (2005) have estimated elasticity of employment in agriculture for Nepal, Thailand and Indonesia for the period 1991-2003 and have found that it has turned negative in recent years. Perugini and Signorelli (2007) also found similar finding for Italy, that manufacturing and agriculture sectors have low employment elasticity (even negative in agriculture) as compare to services sector.

[16] The focus on manufacturing is also one of the peculiar features of Mazumdar (2003) paper. He first stressed the centrality of manufacturing output growth for total economic growth in developing countries, based on the "Kaldor's law" of economic development. However, "if the elasticity of employment with respect to output is low, the economy can end up with an 'enclave' type of development in which the impact of even a respectable rate of manufacturing growth has only a limited effect on the rest of the economy" (p.564)

Table 7 for non-agricultural sectors of the economy. The Table 7 also provides the actual output (GDP) growth in each sector for comparison with the threshold level of growth rate.

Table 7: Threshold and Average Annual GDP Growth Rates in Non-Agricultural Sectors of Pakistan

Sectors	Threshold growth rate in GDP*	Average Annual Growth Rate of GDP (1974 - 2008)
Mining &Manufacturing	19.231	5.759
Construction	1.287	3.819
Electricity	1.968	3.857
Transport	4.620	6.375
Trade &finance	3.142	6.236
All other services	2.224	5.349

*Calculated as the GDP growth rate below which employment growth will be zero.
Source: Calculations by the author based on results of Table 4. The method of calculation was discussed in Previous Paper (Haider, 2009).

Results of Table 7 show that the combined sector of mining and manufacturing in Pakistan had the highest level of threshold GDP growth rate during 1974 - 2008. GDP must rise by about 19 percent in this sector for any employment generation to take place. The actual average rate of growth of GDP in manufacturing has been about 6 percent during 1974 - 2008. Hence, on average, GDP growth in the mining and manufacturing sector was not enough to help generate employment growth.[17] However, GDP growth rates in all other sectors were above their threshold levels.

[17] Similar result has been found by Mazumdar and Sarkar (2007) for India who also report that manufacturing has a large multiplier effect on other sectors.

The mining and manufacturing sectors together employ about 13 percent of employed labour force in Pakistan and their share in national GDP is about 22 percent.[18] Hence, these two sectors together occupy an important position in the economy of Pakistan. These sectors together grew at a rapid rate 5.7 percent over the period of analysis. Any growth in this part of the economy can have a direct as well as an indirect effect on employment in other sectors.[19] The direct effect can come from the additional demand for supporting goods and services produced in other sectors. The indirect effect can come from the additional demand for goods and services which results from additional income that accompanies any combined employment generation in the mining and manufacturing sectors. The economy wide result (reported in Haider, 2009) that the average annual GDP growth rate in Pakistan has been jobless can thus be explained by the jobless growth in the mining and manufacturing sectors combined. A future research should explore any multiplier effect of growth in mining and manufacturing sectors on employment growth in other sectors of the economy.[20]

5: Conclusion

Econometric analysis of sectoral data conducted in this paper reveals that output growth in agriculture sector of Pakistan, the most dominant employer, cannot be viewed as contributing towards more employment in the economy. This sector appears to have absorbed so much labour that labour's marginal product in it has become negative. Any future employment generation in

[18] Anwar (2004) pointed out that growth in large scale manufacturing sector is mainly due to the utilization of excess capacity ranging from 30-40 percent created by large investments in the mid 1990s in thermal power generation through independent power projects (IPPs), cement, sugar, automobile and consumer electronics. Furthermore, employment elasticity of large scale manufacturing sector is very low (0.02) relative to other sectors. Thus, this pattern of growth, together with stagnant investment, does not seem to be pro-poor since it is not likely to generate sufficient employment to offset the large increases in labour force over the years.

[19] Manufacturing also has spillover effects on other sectors through technical progress and on account of Alyn Young's macroeconomic economies of scale. Another important way in which manufacturing benefits the whole economy is through its role in international trade and in balance of payments. This is because of the fact that much the larger part of international trade takes place in manufacturing products.

[20] Kaldor (1967) point out that manufacturing sector is an engine of economic growth because of its multiplier effects on other sectors.

Pakistan will have to rely on non-agricultural growth. In the non-agricultural sectors, output in the mining and manufacturing sectors did not grow at a level necessary to generate employment and this may have been the cause of the overall jobless growth in Pakistan that was concluded in the previous paper (Haider, 2009). Output growth in all other sectors was large enough to generate a positive employment growth.

In the agriculture sector, a negative relationship was found between employment and GDP. This result is in line with Chenery and Syrquin's (1975) suggestion that an increase in agriculture GDP has two opposite influences on agricultural employment. On the one hand, an expansion of the agricultural sector can directly boost employment in that sector, but on the other hand, the overall expansion of the economy decreases employment in that sector as workers switch to non-agricultural sectors where economic growth is causing structural changes. This suggestion can be investigated in a future research. Because of a low income elasticity of demand in the agriculture sector, future economic growth is not likely to cause significant growth in agriculture sector and more labour is expected to move to the non-agriculture sectors. Furthermore, the technical progress in this sector is also likely to be both land and labour saving. The low employment growth linkage in agriculture is contrary to the suggestions of those in literature who argue that development of agriculture sector can be the recipe for poverty reduction (Majid, 2000).

Evidence for jobless growth is found in the manufacturing sector, which has been regarded as one of the main engines of economic growth.[21] The share of this sector in national employment is about 13 percent and in overall GDP, it is about 22 percent. Unlike the early

[21] Mining and manufacturing were considered as combined sector in this study. The share of mining in employment is very small (less than one percent).

years, for example as in the 1970s, manufacturing has not played a major role in labour absorption in Pakistan since the mid-1980s and its contribution towards employment generation has fluctuated, especially in 1986-87, 1987-88, and in 1992-93. This led Majid (2000) to conclude that manufacturing was a main contributor to employment volatility in Pakistan since the mid-1980s. The overall employment trend in manufacturing has been negative. One possible reason is that although demand for the output in this sector has grown about as quickly as GDP, it has not grown fast enough to offset the productivity growth in this sector. A rise in trade and increase in productivity are among the main factors explaining the loss of jobs in the manufacturing sector of developing countries as discussed by Schulze (2004) and Bailey& Lawrence (2004). Mahmood and Siddiqui (2000) also found an increase in productivity in the manufacturing sector of Pakistan.

The share of the Construction sector in employment is 6.2 per cent but it contributes only 2 per cent towards the GDP. Growth in this sector was found to be employment intensive in the present study. Two other studies, Pakistan (2007a) and Ahmad (2006), report a shortage of 6.0 million houses in Pakistan and that the construction sector has the largest employment linkages to other sectors. Nearly 40 industries in the manufacturing sector are linked with construction related activities, in addition to the housing sub-sector. Even if 0.5 million housing units are constructed annually, at least 200,000 to 300,000 additional jobs will be created in the housing sector. The electricity and gas distribution sector (combined) does not appear to have much capacity to absorb labour due its small share in the overall economy, although its growth is also employment intensive according to the findings of present study.

The share of the services sector in employment is 36 per cent. Econometric results showed that service sectors' average growth rate was above the threshold level of GDP growth;

hence, growth in this sector is also employment intensive rather than jobless. Trade and finance sectors, combined, contribute the most towards GDP among other services sectors, and they are also major employers of labour. The finance sector has significantly increased its labour absorption (Pakistan, 2007b) and according to Ahmad (2006), this sector has little capacity to increase employment. Most activities in the trade sector are undocumented and as such this sector is mostly out of the tax net. A proper regulatory framework is needed for the wholesale and retail sectors which can absorb 0.25 to 0.45 million workers during the tenure of PRSP-II 2007-2010.[22]

The transportation sector, another component of services sector, can also be a major employer in services sector, where about three million jobs can be generated in urban as well as in rural areas of the country (Ahmad, 2006). The share of all other industries in the services sector including Ownership of Dwellings, Public Administration & Defense and Community, and S&P Services, is 15 per cent and econometric results of present study showed that these sectors' average growth rate was above the threshold level of GDP growth; hence, growth in these sectors was employment intensive rather than jobless.

The overall conclusion of employment elasticity analysis is that economic growth in Pakistan was jobless only in the manufacturing sector. One can attribute this finding to the faster productivity growth in the manufacturing sector than in services. However, at the same time, there may have been some spillover effect of manufacturing growth in the services sector, especially in the transportation sector thereby causing employment generation in the services sector. A future research can explore this possibility.

[22] Poverty Reduction Strategy of Pakistan.

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Appendix

Table A1: Sectoral Compositions of Pakistan Economy

1. Agriculture
i. Major Crops
ii. Minor Crops
iii. Livestock
iv. Fishing
v. Forestry
2. Industry
2.1. Manufacturing
i. Mining & Quarrying
ii. Manufacturing
a) Large-Scale
b) Small-Scale
2.2. Construction
2.3. Electricity and Gas Distribution
3. Services
3.1. Transport, Storage and Com.
3.2. Trade and Finance
i. Wholesale and Retail Trade
ii. Finance and Insurance
3.3. All others Services
i. Ownership of Dwellings
ii. Public Administration & Defense
iii. Community, S & P Services