

# Can Sectoral Reallocation Explain the Jobless Growth?

Empirical Evidence from Pakistan

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### **Abstract**

This paper investigates that “can sectoral reallocation explain the jobless growth” in a developing country like Pakistan. The issue is important for many developing countries because recent changes in the use of capital – based foreign technology has resulted in substitution of labour with non-labour inputs such as capital. Structural change of an economy is often proxied by employment shifts between industrial sectors. The paper analyses the four commonly measures of sectoral reallocation proposed by Lilien (1982), Groshen and Potter (2003), Rissman (1997), and Aaronson, Rissman and Sullivan (2004) over the time period 1967-2008. The analysis of structural change based on aggregated employment data for seven sectors of the economy yields some mixed results. Results indicate that the different measures show that the economy of Pakistan underwent structural change during periods of recession and recovery. However, it does appear that structural changes were more pronounced at the time of 1991 recession than at the time of 2001 recession. This result is largely due to significant shifts in employment from agriculture towards services sectors. The findings of this paper suggest that all measures show that sectoral reallocation is one of the major causes of jobless growth in Pakistan.

Key Words: Sectoral reallocation, Employment, Jobless growth, Pakistan,

JEL Classification: J0, J21, J23, J24

## **Introduction:**

The present paper discuss the nature of structural changes in employment to understand “jobless” growth in Pakistan economy over the period of analysis from 1967-2008. As we previous examined the sectoral analysis of Pakistan economy and found that Jobless growth in manufacturing was anticipated. So industrial sector has a significant importance in any economy of the world today. As White (1983) highlighted the goal of the Industrial Development Agency (IDA) in the following:

*“The IDA is therefore looking at a concept of industrial development which focuses on the output or income generating capacity of industry. In this concept the role of industry is to generate the maximum possible output and wealth in highly productive enterprises while the main employment benefits are generated and captured outside the manufacturing entities themselves”.*

In this paper we are more interested in the nature of structural change that took place in Pakistan economy over the 1967-2008 periods. The rest of the paper is as follow: In section 1 discusses the structural shift in the Pakistan economy and also compares it with some developed and developing countries especially in term of employment by economic activity. Based on past literature four commonly measures of sectoral reallocation are identified in Section 2 and the impacts of these measures in case of Pakistan are discussed broadly in Section 3 by using descriptive tools of data analysis. Section 4 presents a summary of findings.

### **1. Structural Shifts in the Economy**

The structural adjustments in the development of economic growth have been studied at extent. The past experience of the industrial countries in this view across nearly 200 years is now available. The pattern of economic development of today’s industrial countries has followed a general pattern. In the beginning, the share of agriculture in total output decreases, while the

share of industry increases. Traditionally this procedure has lasted for significantly long period. On the other hand, ultimately the share of services increases with the share of industry decreases. Thus usually the procedure of economic development is marked by three diverse stages: an initial stage agriculture have the powerful sector of the economy , an intermediate stage dominated by industry and a final stage dominated by services. The timing of the different stages of structural change and the length of such changes has, however, been different across different countries. At its climax, industry had accounted for 50 per cent of the total output in many of these countries. In most of these countries, it declined in the later phase to around 25 per cent.

### **Employment by Economic Activity:**

When someone analyse the Pakistan employment by sector wise then it is important to note that what is the situation in Pakistan as compare to some developed and developing countries. In below tables 1(a) and 1(b) is shows the share of employment by economic activity of some developed and developing countries respectively.

When compares the employment share by economic activity, developed countries share of employment in agriculture sector is very low as compares to developing countries. In 1980 agriculture share in employment on average is above 50 percent almost in all countries and in 2005 it decreases to 40 percent. But in developed countries share of employment in agriculture sector in 1980 is less than 10 percent and further decreased to below 5 percent in 2005 and same situation is industry sector. On the other hand in services sector developed countries shares are above 55 percent in 1980 and a large increased in 2005 to above 70 percent.

**Table1 (a): Share of Employment by Economic Activity (%) (Year 1980 &2005) Developed Countries**

Country	1980			2005		
	Agriculture	Industry	Service	Agriculture	Industry	Service
UK	2.6	37.2	58.9	1.4	22.0	76.6
USA	3.6	30.8	65.7	1.6	20.6	77.8
France	8.7	35.9	55.4	3.8	24.3	71.5
Japan	10.4	35.3	54.0	4.4	27.9	66.4
Germany	4.2	40.3	55.5	2.4	29.7	67.8
Italy	14.0	37.2	48.7	4.2	30.7	65.1
Australia	6.5	31.0	62.4	3.6	21.1	75.0
Canada	5.4	28.5	66.0	2.7	22.0	75.3
Newzeland	10.9	33.8	55.3	7.1	22.0	70.6
Spain	19.3	35.9	44.7	5.3	29.7	65.0

Source: World Development Indicators (WDI), 2008

Data on Germany is for comparison is from 1991 and 2005 , because reunification of Germany was in 1990.

But in developing countries services sector shares in total employment is 30 percent and increased to 40 percent in 2005. As we can see that if any country have a large share of its employment is in agriculture sector then it is most probable it faces a problem of jobless growth, as seen from below table 1(b) that most of the developing countries have a large share of its employment in agriculture sector.

**Table1 (b): Share of Employment by Economic Activity (%) (Year 1980 &2005) Emerging Economies**

Country	1980			2005		
	Agriculture	Industry	Service	Agriculture	Industry	Service
China	68.7	18.2	11.7	44.1	25.5	28.7
Indonesia	56.4	13.1	30.4	42.1	18.6	39.3
Thailand	70.8	10.3	18.9	42.6	20.2	37.1
Philippines	51.8	15.4	32.8	37.0	14.9	48.1
Malaysia	37.2	24.1	38.7	14.8	30.1	55.1
Korea Rep.	34.0	29.0	37.0	7.9	26.8	65.1
Pakistan	52.7	20.3	26.8	43.0	20.3	36.6
India	69.1	13.6	17.3	57.0	21.0	22.0
Sri Lanka	45.9	18.6	29.3	33.5	22.8	36.8
South Africa	10.9	25.1	63.9	10.3	24.5	65.1
Bangladesh	64.8	11.0	24.2	51.7	13.7	34.6

Sources:

1. World Development Indicators (WDI), 2008
2. Data for Indonesia is for 2006 as the most recent year given in WDI, 2008
3. Data for China is for year 1980 and 2002, as the most recent year given in WDI
4. Data for India's sectoral employment share is derived from various sources. I also had taken the same source. But data for comparison is 1990 and 2002.
5. Data on South Africa is 1999&2003; Bangladesh is for1983- 2003 and Sri Lanka for 2004 as the most recent year given in WDI, 2008

In most developing countries the shift out of agriculture resulted in a decreasing relative share of agricultural employment, although the absolute number of jobs in agriculture has continued to increase.<sup>2</sup> In Europe, North America and Oceania there was also an absolute decline in agricultural employment. The absolute decline in agricultural employment is considered to be an important turning point in the process of structural change. It means that agricultural

<sup>2</sup> Source: ILO, Economic active population, 1950-2010

productivity growth is sufficient to sustain the food supply of growing numbers of people without any additional labour input (Fei and Ranis, 1976). Industrial employment trends also show a distinctive pattern for the developed world and the developing world. In Asia, Africa and Latin America the relative share of industrial employment increased gradually. In contrast, the relative share of industrial employment in the developed world reached a turning point. In Europe the industrial share has declined since the 1970s, whereas in Oceania and North America this trend was already visible since the 1950s. The absolute numbers of industrial employment have also slowed down considerably and have even turned negative in a number of advanced countries although this trend has not shown up in the aggregate figures yet.

The shift of employment towards services can be stated as a “stylised fact” of post war economic development (Kuznets 1965). The transfer of labour to services is a very diverse process though. Firstly, economic growth in general implies an increasing contribution of services as a response to an increased demand for trade, transport, communication and social services. This service employment growth effect can be considered partly as a classic type of economic development based on the integration of markets and the increase of scale enhancing specialisation and the division of labour. As a result many service activities have become independent activities, outsourced from the agricultural and industrial activities in which they were once embedded.

Secondly, services can also arise as a result of the rise of the welfare state, giving a large role to health, education, government and social services. Finally, employment growth in the service sector can result from a lack of productivity growth in the rest of the economy. In particular demographic pressures in rural areas lacking sufficient employment opportunities have caused large flows of rural urban migration. These migrants were mostly absorbed by the urban

informal service economy. The service sector more easily absorbs hidden unemployment than the industrial sector, because of the possibilities of small-scale and low capital intensive work. There have been substantial discussions in the literature on the possibilities for the service sector to raise productivity. One argument is that there are inherent problems of increasing productivity growth in services (Baumol 1967). But there is increasing evidence that at least part of the service sector (in particular the market services) profited from technological and organisational innovations enhancing productivity growth.

## **2 Literature Review**

Structural change in the labour market, also called sectoral change or reallocation, is said to occur in a labour market when there are changes in the composition of aggregate demand for goods and services, or when there are changes in the productivity of labour, that result in an industrial shift in labour demand. When the labour market is undergoing structural change, workers may lose jobs because their current skills are no longer in demand. Hence, if an economic growth is accompanied by structural change, there is a potential for this growth to be jobless. This possible explanation of jobless growth in the United States was first suggested by Aghion and Howitt (1994) and then later empirically studied by Rissman (1997), Groshen and Potter (2003) and Aaronson et.al (2004).

They claimed that a substantial percentage of a dismissal of employees can be recognized to permanent rather than short-term. Permanent dismissals of employees are a feature of structural unemployment as industries fade away. They explained that indicative of structural change are industries that continue to lose jobs after having lost jobs during the last recession or industries that continue to gain jobs after having gained jobs during the last recession. Exactly



what is driving the structural change, however, is not clearly established. One explanation might be the relative position of the US in the international economy. Indeed, Bernanke (2003) suggested trade might be a factor that accounts for the change. When there is stronger structural change, as observable in the last decade and as discussed above, labour market search and matching institutions become important in helping to match the supply of vacancies to the demand for labour through job searches by the unemployed (other labour market institutions, such as the type and length of labour contracts, are also important, see also Okun 1962). But when structural change is weak or in other words economic growth does not lead to changes in the basic structure of the economy, policy should look to establish forward and backward linkages between different sectors of the economy.

Some studies have also examined the relationship between sectoral changes and business cycles. These studies including Lilien (1982), Abraham and Katz (1986), Campbell and Kuttne (1996), Davis (1987), Loungani, Rush, and Tave (1990) decompose changes in labour productivity into a component due solely to changes within plants and a component due to sectoral reallocation of labour across plants and analyze the cyclical behavior of both components.

Papers that investigate how reallocation can amplify and/or propagate aggregate shocks include Den Haan, Ramey and Watson (2000), Merz (1995) and Andolfatto (1996). Baily, Bartelsman and Haltiwanger (1998) decompose changes in labour productivity into a component due solely to changes within plants and a component due to reallocation of labour across plants and look at the cyclical behavior of both components. They find that reallocation related changes in productivity are counter-cyclical. Bar Levi (1998) looks at how incentives for workers to wait

until recoveries to start looking for new jobs can impart a pro-cyclical bias to labour productivity.

When begin by reviewing previous work on measures of sectoral reallocation which includes evidence on the extent of worker displacement, reasons for unemployment, and job creation and job destruction, as well as statistical models of reallocation based on readily available sectors-level employment data. Start with the seminal measure of Lilien in 1982, with a particular emphasis on the recent contribution of Erica Groshen and Simon Potter (2003), the study most often cited by those who identify sectoral reallocation as the cause of the recent “jobless growth.” Finally, a new evidence of the extent of sectoral reallocation based on the methodology of Aaronson, Rissman and Sullivan (2004) which is based on the paper of Rissman (1997). Groshen and Potter (2003) have unearthed some interesting clues about what factors may be leading to jobless growth, but Aaronson, Rissman and Sullivan (2004) do not believe that the statistic that they identify— the correlation between employment growth rates during and after recessions—is a particularly close proxy for sectoral reallocation.

### **3. Measures of Sectoral Reallocation: Pakistan’s Economy**

If economic growth is accompanied by structural changes in the economy, workers may have to retrain and update their skills. Hence, some unemployment may occur in the economy thereby weakening the relationship between employment and GDP growth rates. Structural change of an economy is often proxied by employment shifts between industrial sectors. An in-depth analysis of structural change in the economy requires disaggregated employment data within each of the seven sectors identified in Appendix Table A1. Unfortunately, such

disaggregated data are not available. Hence, only some broad patterns of sectoral change are analyzed for the present study.

Four measures of structural change in the economy are commonly used in the literature. These measures have been proposed by Lilien (1982), Groshen and Potter (2003), Rissman (1997), and Aaronson, Rissman and Sullivan (2004) and are discussed below. The measure proposed by Groshen and Potter (GP) is discussed first. Because of the similarities between the other three measures, they are discussed after the GP measure.

### **Groshen and Potter's (GP) Measure**

Following Groshen and Potter (2003), industrial sectors that continue to experience slower than average employment growth during and after recession as well as those sectors that continue to experience faster than average employment growth during and after recession can be considered as undergoing structural change. The statistic suggested by these authors, the GP statistic, measures the percentage of such sectors in all sectors of the economy. In present study, Pakistan's economy was divided into seven sectors.<sup>3</sup> Annual data are used for each sector's employment, although it will be preferable to use monthly data but they are not available.

First, growth rate in employment in each sector is compared with the average employment growth rate during different phases of the business cycle as shown in Table 2.<sup>4</sup> The signs of sectoral changes concluded in columns (11) and (12) are for the start of recessionary and recovery periods as they are for one year after peak and trough. To account for any randomness in employment fluctuations that could affect employment growth in these years, employment

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<sup>3</sup> See Appendix Table A1.

<sup>4</sup> When monthly data are used, GP's measure is based on a recession period that starts one month after the business cycle peak and an 11-month post-recession period that begins the month after the business cycle trough.

changes in peak and trough are also compared (over an entire half cycle) and signs of sectoral change concluded in columns (9) and (10). To help the intuition of the reader, an example has been provided in the notes below Table 2.

**Table 2: Employment Growth Rates by Sectors in Peak and Trough and in the Years Following Peak and Trough in Pakistan**

Sectors	Employment Growth Rates in Peak and Trough				Employment Growth Rates one year after Peak and Trough				Effects of Sectoral Change			
	Peaks		Troughs		Peaks		Troughs		In Peak and Trough		1year after Peak and Trough	
	1968-69 (1)	1990-91 (2)	1978-79 (3)	2001-02 (4)	1969-70 (5)	1991-92 (6)	1979-80 (7)	2002-03 (8)	1968-69 (9)	1990-91 (10)	1969-70 (11)	1991-92 (12)
Agriculture, forestry, hunting and fishing	3.86	-2.33	1.92	-2.99	3.93	-2.70	2.84	-1.42	No	-ve	+ve	-ve
Manufacturing, Mining and quarrying	-0.21	-1.23	5.42	8.12	1.12	-5.13	-9.13	8.61	No	No	-ve	No
Construction	2.42	-0.67	8.61	3.20	3.12	2.57	-2.29	3.02	+ve	No	No	+ve
Electricity, gas, water and sanitary	2.54	9.49	16.42	6.70	-3.39	11.02	5.57	1.41	+ve	+ve	No	No
Transport and communication	-0.88	3.69	2.30	7.18	-0.46	3.75	-1.48	7.01	-ve	+ve	-ve	+ve
Trade and Finance	-2.73	2.75	3.83	4.92	1.90	3.36	-2.83	5.83	No	+ve	-ve	+ve
All Others services	-2.56	2.83	4.18	4.64	-4.00	6.28	30.02	5.10	No	+ve	No	+ve
<b>Total Employment Growth Rate</b>	<b>1.59</b>	<b>-0.42</b>	<b>3.31</b>	<b>1.64</b>	<b>2.29</b>	<b>-0.26</b>	<b>2.79</b>	<b>2.74</b>				

Notes:

1. The year after each peak and trough represents the start of recession and recovery periods, respectively.
2. Employment growth rates in peak and trough are also considered to cover for any possibility of randomness in the results based on recession and recovery periods. For details, see Aaronson, Rissman and Sullivan (2004).
3. For agriculture, the positive effect in Column (11) is concluded as follows: Employment growth one year after peak (3.93) exceeded the average for all sectors (2.29) and so did the employment growth one year after the trough (2.84 and 2.79). Hence, a positive effect of sectoral change on employment in agriculture is concluded. No effect in Column (9) is concluded as follows: Employment growth in peak (3.86) exceeded the average growth for all sectors (1.59), but employment growth in trough (1.92) was slower than the average (3.31). Hence, no sectoral change is concluded. The same method is followed for other sectors.

From Table 2 it can be seen that when one considers employment growth rates from one year into recession to one year into recovery (one year after peak and one year after trough as reported in columns 11 and 12), the effect of structural change in the economy appears somewhat less pronounced in the 1969-70 recession than it was in the 1991-92 recession. During the 1969-70 recession, a sectoral employment change was observed in four sectors while this was the case in five sectors during the next recession. Electricity, water and sanitary sectors did not experience any structural shift, collectively. If one considers employment growth rates over the half business cycle (in peak and trough as reported in Columns 9 and 10), then the structural shifts are found to be even less pronounced during 1969-70 as this occurred only in three sectors. However, the electricity, water and sanitary sector does show structural shift under this method. Only the transport and communication sector is found to have experienced structural shifts under both methods during both recessions. All other sectors show mixed results.<sup>5</sup>

While one weakness of the above analysis is its use of aggregated data, another weakness is that it is based on only four data points which may not capture full fluctuations in employment during the period. Other measures such as those provided by Lilien (1982), Rissman (1997) and Aaronson et.al (2004) are improvements over the GP measure. All three measures consider deviations of annual employment from a standard level, but differ in the measurement of this deviation. These methods are discussed next, followed by their results.

### **Lilien's Measure**

Lilien (1982) holds that in the absence of structural change, employment in all sectors will grow at the same rate. By contrast, when labour is being reallocated across industries,

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<sup>5</sup> Groshen Potter (2003) also provided a descriptive statistic based on the correlations between the difference of employment growth rate in each sector from the national average before and after recession. This statistic will not be meaningful for present study due to small number of observations (only seven).

expanding industries will grow faster than average and contracting industries will grow slower. Lilien proposed a measure of structural change based on the standard deviation of employment growth rates across industrial sectors calculated as follows:

$$\sigma_t^L = \left[ \sum_{i=1}^n S_{it-1} (GE_{it} + GE_t)^2 \right]^{1/2}$$

Where  $GE_{it}$  is employment growth in sector  $i$  at time  $t$ ,  $GE_t$  is the combined employment growth rate for all sectors or it is the national average growth rate in employment, and  $S_{it}$  is the share of total employment in sector  $i$  at time  $t$ .<sup>6</sup> If all sectors grow at the same rate, Lilien's measure would be zero. The measure is always positive and larger, the more an individual sector's employment growth rate exceeds the average. The variable  $\sigma_t^L$  is called the Lilien measure of structural change.

Some economists, such as Abraham and Katz (1986) have criticized the Lilien measure.<sup>7</sup> They note that employment growth in some sectors, such as the commodity-producing sectors, typically declines faster during economic downturns than employment growth in service-producing sectors. This pattern implies an increased dispersion in sectoral employment growth during contractions and a reduced dispersion during expansions, even if there is no actual impact

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<sup>6</sup>A sector's employment growth is related to its share of employment by the following mathematical relationship:  $\Delta \ln(S_{it}) = \Delta \ln(E_{it} / E_t) = GE_{it} - GE_t$ .

<sup>7</sup> The findings of Abraham and Katz (1986), Loungani, Rush, and Tave (1990) and Rissman (1993,1997) contrast with Davis and Haltiwanger (1992) who find that 99% of reallocation is within 2-digit industries and 88% within 4-digit industries. Davis and Haltiwanger emphasize the importance of within-sector reallocation to avoid Abraham and Katz's (1986) criticism of Lilien (1982). By definition, differential responses of sectors to common shocks cannot be responsible for the correlation of within sector reallocation with the cycle. The difference between the Davis and Haltiwanger measures of across-industry reallocation and the results presented here owe to temporary reallocation. Davis and Haltiwanger compute reallocation as the sum of job creation and job destruction, and this includes many short-term job flows. Thus, while temporary reallocation is overwhelmingly a within-sector phenomenon, permanent reallocation is not.

of this change on aggregate employment. Consequently, sectoral change as measured by Lilien captures both the process of sectoral change and the normal employment flows of the business cycle. The measure does not tell us which sector is positively or negatively affected by recession or recovery. Hence, we cannot be certain that a high measured value of dispersion in employment growth is a signal of anything other than low economic activity.

### **Rissman (1997) Measure**

Rissman (1997) tried to incorporate Abraham and Katz's criticism of the Lilien's measure. The Rissman measure is based on a decomposition of the time series of sectoral employment share growth rates into three components. The first component reflects the long-term growth trend of employment in each sector. The second component, as noted by Abraham and Katz (1986), is the predictable movement of employment into and out of certain industries over the business cycle. The third component is the unexpected movement of workers across sectors or industries, i.e., changes across sectors that occur for reasons distinct to business cycles or long-term secular reasons. These unexpected movements, which Rissman calls idiosyncratic shocks, could be thought of as transformational changes in a firm or industry due to reforms, reorganizations, or other factors that might shift inputs to more valuable uses. Employment changes like these are likely to be the most upsetting to the labour market because they are unpredictable (unlike long term trends) but are everlasting characteristics of the conditions (unlike cyclical trends).

Similar to Lilien (1982), Rissman proposed a measure of sectoral change based on the estimates of idiosyncratic shocks,  $\hat{U}_{it}$ . Specifically,

$$\sigma_t^R = \left[ \sum_{i=1}^n \hat{S}_{it-1} (\hat{U}_{it})^2 \right]^{1/2}$$



The term  $\hat{S}_{it-1}$  is sector  $i$ 's acyclic employment share at time  $t-1$ . This employment share is hypothetically what the sector's employment share would have been if the national employment cycle were held constant at a value of zero, i.e., national employment was stagnant. The acyclic employment share would depend only on the sector's long-term trend and i.e., random, idiosyncratic shocks. The  $\hat{U}_{it}$ 's are estimates of the idiosyncratic shocks for each sector obtained from the H.P filter estimation exercise. In short, this measure relies upon unanticipated variations in the composition of sectoral employment growth. Long-term structural change affects the measure only through its effect on the acyclical employment shares. Because of its construction, the measure directly addresses the Abraham and Katz's critique of Lilien's measure.

### **Aaronson, Rissman and Sullivan Measure**

Aaronson, Rissman and Sullivan (2004) provide a measure of sectoral change that is somewhat in between those proposed by Lilien and Rissman. Their measure is given by:

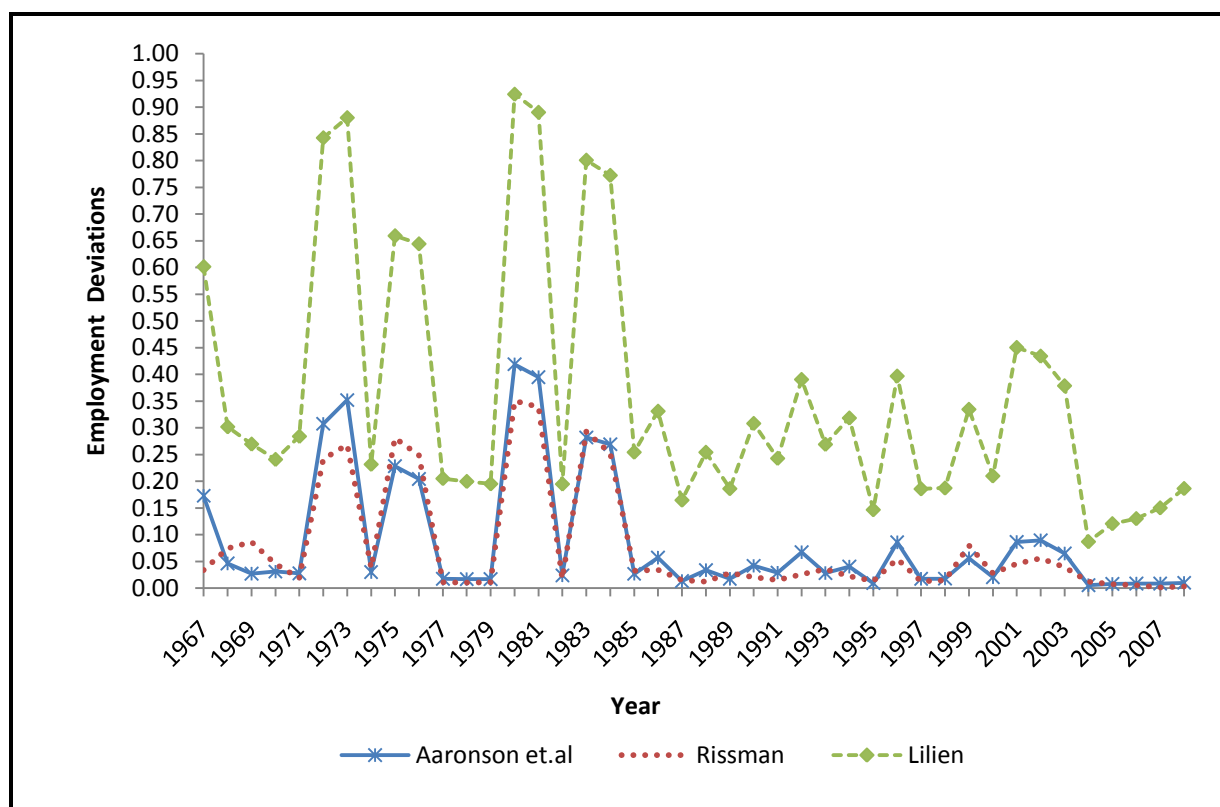
$$\sigma_t^A = \left[ \sum_{i=1}^n \hat{S}_{it-1} (\hat{T}_i + \hat{U}_{it})^2 \right]^{1/2}$$

The above measure calculates variations in the composition of sectoral employment growth that are unrelated to the normal shifts that occur as the result of business cycle. It is a broader measure of sectoral change in that it considers long-term change in a sector employment share  $\hat{T}_i$  separately as a sectoral shift.

Figure 1 plots the above three measures of structural change obtained for Pakistan's economy. The data are provided in Appendix Table A2.

Annual dispersions in sectoral employment, using the above three measures, are provided in Figure 1. Lilien’s method shows that sectoral employment growth deviations around the national growth have been positive in all years indicating that Pakistan’s economy has been experiencing structural changes in all years. However, the measure did not show a systematic pattern until 2003. It dropped during the 1969-70 recession while it rose during the 1991 recession indicating more pronounced structural changes during the later recession.

**Figure 2: Lilien, Rissman and Aaronson et.al Measures of Sectoral Variations in Employment, Pakistan (1967-2008)**



Source: Based on own calculations presented in Appendix Table A2. Lilien’s measure is based on sectoral employment growth deviation from the national employment growth. Rissman’s measure is based on shifts in the employment composition that are unrelated to the business cycle. Finally, the Aaronson et.al measure is similar to that of Rissman, but it also includes long-term change in sector employment as a sectoral shift.

The other two measures of employment dispersion are lower because of the way they are measured. These two measures also indicate an overall structural change in the economy, although the evidence is weak in recent years. Hence, it may be concluded that structural changes did take place during the two recovery periods in Pakistan. Finally, the data plotted in Figure 1 show that all three measures of structural shift are sensitive to business cycles.

A summary of the three measures of sectoral change is provided in Table 3 during periods of recession and recovery. On average, more employment shifts took place between sectors during the ten years of first recession as was also true for the first recovery period.

**Table 3: Comparison of Three Measures of Sectoral Allocation in Recoveries and Recessions**

Average Dispersion of Employment Growth				
Sectoral Change Measure	Recession		Recovery	
	1969-70 to 1978-79	1991-92 to 2001-02	1979-80 to 1990-91	2002-03 to 2007-08
Aerosen et.al	0.123	0.047	0.134	0.017
Rissman	0.117	0.035	0.117	0.011
Lilien	0.438	0.302	0.444	0.175

Source: Based on own calculation presented in Appendix Table A2.

The above discussion mostly focused on periods of recession. The three measures also exhibit similar trends during periods of recovery.

#### 4. Conclusion

In the present study, three measures of sectoral reallocation show identical results in recession and recovery. The 1969-70 recession and recovery was very much affected by sectoral reallocation as compared to the 1991-92 recession and recovery. An examination of employment

by industrial sectors in Pakistan shows that the structural change taking place in the Pakistani economy is not necessarily benefiting the bulk of workers who lack decent employment.<sup>8</sup> Some estimates suggest that employment in the informal economy increased from 66 per cent of non-agricultural employment in 1999-2000 to 72 per cent in 2007. During the same period, wage and salaried employment increased by not more than 1.7 percentage points of the employed, while the number of self employed workers decreased by more than seven percentage points. The percentage of the employed working excessive hours declined slightly, but only because the percentage of females in total employment had increased. The percentage of male workers working excessive hours rose to more than 47 percent. This evidence indicates significant sectoral reallocations in Pakistan.

In conclusion, the analysis of structural change based on aggregated employment data for seven sectors of the economy yields some mixed results. This result is largely due to significant shifts in employment from agriculture towards services sector as recorded in GP method. The GP method also recorded significant changes in the transport sector. The “Yellow Cab” scheme introduced in the mid-1990s by the regime of former Prime Minister Nawaz Sharif, which made it easier for investors in transport sector to import vehicles from abroad, may have caused an expansion of this sector.

In summary, the different measures show that the economy of Pakistan underwent structural change during periods of recession and recovery. However, there is an indication of stronger structural changes in the 1970s than in other periods. In conclusion, there is sufficient evidence to suggest that sectoral reallocation in Pakistan during 1968-1985 was a main cause of the jobless growth during that period. When more disaggregated data are available, one can

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<sup>8</sup> Pakistan Employment Trends, No.2, 2007.

perform an in-depth analysis of employment shifts within each of the seven sectors to investigate if these shifts caused production in each sector to become more or less capital intensive.

## Appendix

**Table A1: Sectoral Compositions of Pakistan Economy**

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

**Table A2: Measures of Sectoral Change**

<b>Year</b>	<b>Aaronson et.al</b>	<b>Rissman</b>	<b>Lilien</b>
1967	0.1727	0.0337	0.6017
1968	0.0461	0.0745	0.3019
1969	0.0271	0.0860	0.2695
1970	0.0309	0.0449	0.2408
1971	0.0275	0.0183	0.2841
1972	0.3075	0.2412	0.8429
1973	0.3519	0.2686	0.8806
1974	0.0301	0.0380	0.2316
1975	0.2280	0.2809	0.6595
1976	0.2042	0.2486	0.6444
1977	0.0175	0.0106	0.2050
1978	0.0168	0.0104	0.1996
1979	0.0170	0.0110	0.1951
1980	0.4189	0.3503	0.9245
1981	0.3947	0.3389	0.8907
1982	0.0237	0.0172	0.1947
1983	0.2818	0.2928	0.8011
1984	0.2692	0.2520	0.7726
1985	0.0266	0.0325	0.2543
1986	0.0567	0.0343	0.3311
1987	0.0132	0.0147	0.1645
1988	0.0334	0.0117	0.2542
1989	0.0174	0.0282	0.1860
1990	0.0417	0.0204	0.3082
1991	0.0290	0.0148	0.2428
1992	0.0670	0.0259	0.3905
1993	0.0283	0.0352	0.2690
1994	0.0401	0.0224	0.3184
1995	0.0092	0.0131	0.1465
1996	0.0855	0.0546	0.3968
1997	0.0172	0.0125	0.1856
1998	0.0176	0.0143	0.1872
1999	0.0558	0.0795	0.3346
2000	0.0205	0.0277	0.2098
2001	0.0862	0.0453	0.4504
2002	0.0895	0.0557	0.4342
2003	0.0645	0.0390	0.3787
2004	0.0055	0.0123	0.0868
2005	0.0077	0.0072	0.1205
2006	0.0085	0.0052	0.1300
2007	0.0084	0.0013	0.1501
2008	0.0098	0.0031	0.1863

Source: Based on author's own calculations.

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