Trade liberalization and environment testing of pollution pakistan economics essa...

A strong relationship among trade liberalization and environment is debated over the long time. The paper tested the Pollution Haven Hypothesis (PHH) for Pakistan using pollution term of trade for two region U. S. and E. U. (U. K. and Germany). The environmental indicators for this study were CO2 and SO2 emissions from fossil fuel burning during 1990-91 and 1994-95. The result exposed that Pakistan trade does not support the PHH in both regions by obtaining the pollution terms of trade below 100.

Keywords: trade liberalization, environment, pollution haven hypothesis, emission, pollution term of trade, Pakistan, U. S. and E. U. (U. K. and Germany)

JEL classification: F18, O13, L60, Q56

Introduction

There is a decisive debate on among environmentalists, economists, policy makers and business activists since last decade that there exist a strong relationship between trade liberalization and environment (Copeland and Gulati, 2005, Qureshi, 2006, Gallagher and Ackerman, 2000). Trade liberalization accelerates economic growth but at the same time leads to environmental degradation particularly in developing countries. Over the last few decides the process of environmental degradation has accelerated with an alarming rate in developing world. In developed countries there are strict environmental regulations and as such pollution intensive industry diffuses to developing countries where regulations are lax. Thus developing countries, though, enjoy opportunities due to the ‘ increase in growth’ but at the same time confront perils because of the ‘ diffusion of pollution-intensive

industry’ from developed countries as the trade liberation takes effect. By adopting trade liberalization policies, a country may expand or contract the scale of production, specialize towards or from the production of relatively pollution intensive or natural resources degradation, or use unclear/ dirtier technologies in production process (Copeland and Taylor, 1994).

Business lobbyists in developed countries are concerned that strict environmental regulations reduce their competitiveness and shift pollution intensive industries to developing countries. Policy makers in developing countries fear that links between trade and environmental policy will be used as another avenue for rich countries to erect barriers to imports (Copeland and Gulati, 2005). Therefore, it is imperative to analyze that trade liberalization could and should be good for the environment (opportunities) and the opinion that its effects will be negative (perils) in the context of developing countries.

There are three channels through which trade affects environment.

Scale effect (change in the overall level of economic activity):

Trade liberalization can enhance domestic economic activities, which may contribute to an increase in production of all sectors of the economy. Scale effect cause overexploitation and misuse of natural resources and hence contributes to the environmental degradation. Though, scale effect of trade on environment leads to encouraging short-run economic growth but at the cost of impeding long-run economic development resultantly not succeeding to achieve sustainable development1.

Composition effect (changes in the type of economic activity):

Composition effect occurs when trade liberalization leads certain economies to specialize in sectors where they enjoy comparative advantage. When the reason for comparative advantage is the difference of environmental strictness among countries then composition effect of trade liberalization will make worse environmental problems in developing countries where environmental regulations

are relatively lax. Trade causes environmental degradation in developing countries because most developing countries have weak regulatory infrastructures and lack of environmental awareness. Due to these lax environmental regulations environmental intensive industries shift from developed countries to developing countries through trade liberalization2.

Technique effect (change in the environmental intensity of production):

The above channels (scale and composition effects) are supported by environmentalists arguing that trade liberalization have a negative impact on environment (Qureshi, 2006). According to environmentalists scale and negative composition effects are complementary where the latter leads to pollution heaven hypothesis and the former causes over exploitation of natural resources.

The above claim by environmentalists is challenged by the proponents of free trade who assert that free trade facilitates diffusion of environment friendly technologies, management techniques and information between

developed and developing countries. Thus, according to the proponents trade liberalization creates a positive technique effect. This positive technique effect has a potential to outweigh the negative scale effect of increased production and at the same time liberalization leads to a positive composition effect via income growth. Increases in per capita income induced by greater openness enhances consumer’s preference for environmental friendly products, advances cleaner production techniques and reduces the share of pollution incentive products in the total output (Qureshi, 2006).

Technique effect can potentially lead to a decline in pollution per unit of output for two reasons; first, trade liberalization and investment may encourage multinational corporations to transfer cleaner technologies to developing countries. Second, if economic liberalization increases income levels the newly affluent citizens may demand a cleaner environment (Gallagher and Ackerman, 2000). Environment awareness campaign and programs also motivates people to adopt and encourage environment friendly technologies.

Two contradictory ideas emerged from the debate; the first is that due to scale effect negative composition effect trade liberalization which leads environmental degradation in developing countries. These can be summarized as pollution heaven hypothesis (PHH). Under the PHH changes in environmental legislation can distort existing pattern of comparative advantage. In developed world the costs of complying with environmental regulations appear to be increasing steadily as the stringency of environmental regulations increases with income and economic development

(Daisgupta et al., 1995). The PHH assumes that developing country possess a comparative advantage in pollution intensive production.

Developing countries increased their comparative advantage in pollution intensive manufacturing exports over the period 1965-1988 (Low and Yeats, 1992). Birdsall and Wheeler (1993) conclude that protected economies are more likely to support pollution-intensive industries while openness actually encourages cleaner industries through the importation of developed countries pollution standards in case of Latin America. Mani and Wheeler (1997) found that developing countries were increasing their comparative advantage in pollution intensive industries. There were no apparent result in these studies that trade liberalization was responsible for the changes in the pattern of industrial production.

Levinson (1996) used US data on plant pollution abatement costs from 1982-1987 and found that interstate differences in environmental regulations do not affect the location choices of most manufacturing plants. Levinson (1999) used panel data on hazardous waste trade flows between states in the US. Using data on both trade flows and taxes on hazard waste disposal, he found that higher waste taxes were associated with higher import flows of hazardous waste into a state. According to his result the states which have attractive sites for hazardous waste processing are more likely to have to respond to waste inflows with stricter environmental regulations.

Antweiler et al. (2001) have made more detailed extrapolations of the original Hecksher-Ohlin model of trade. They decomposed the whole impact of trade openness or trade liberalization on environment into composition,

scale and technique effects. They derived the conditions under which trade liberalization for a dirty good leads to less pollution, f the technique effect can overcome the combined scale and composition effects.

Ederington and Minier (2003) use cross-sectional time series data on net imports in US manufacturing from 1978-92, they find a small positive effect of pollution on imports. Copeland and Taylor (2003) have made a detailed empirical work on developed countries like United States and Canada and find that these countries have comparative advantage in capital- intensive dirty products. On the other hand they found that India’s comparative advantage lies in labor- intensive and relatively clean goods production. Cole et al. (2001) test two models for the trading partners like United Kingdom-Asia, United States-Asia, United States-Latin America and Japan-Asia they found mix results. In the HOV model they found no evidence to suggest that environmental regulations are determining net exports. Their evidence suggests that differences in environmental regulations and factor endowments are, to some extent, influencing global trade patterns.

Ederington et al. (2004) have analyzed the composition effects of trade and environment. They look at changes in the pollution content of U. S. manufacturing output, imports and exports from 1972-1994. According, to their findings, the composition of U. S. trade has changed so that the U. S. exports have become dirtier relative to U. S. imports.

Mukhopadhyay and Chakraborty (2005) used the pollution terms of trade to test the pollution haven hypothesis for India and the rest of the world and EU. According to their finding Indian evidence does not support the pollution

haven hypothesis in both cases. Quareshi (2006) used bilateral trade statistics from 1975-2003 and test the hypothesis that Pakistan’s net exports of pollution intensive products have increased to the OECD countries. He revealed the evidence to support the claim that exports have grown in the pollution- intensive sectors relative to cleaner ones after liberalization practices.

The paper intends to test the pollution heaven hypothesis (scale and negative composition effects) for Pakistan with US and EU (UK and Germany), also, highlighted the overall trade policies, performance and environmental profile of the country.

Khail and Inam 2006 used Pakistan over the period 1972-2002 applying Johansen-Juselius cointegration technique for valid long run relationship among the variables and error correction models to determine the short run. The study found a valid long run relationship among the variables. In their findings both CO2 emission and arable land (AL) have significant long run relationship but have no significant relationship among AL and trade variables. While the study found a significant short run relationship among CO2 emission, per capita income and foreign direct investment (FDI).

Cole et al. 2006 developed a political economy model using panel data from 33 countries on the relationship between the stringency of environmental policies and foreign direct investment (FDI). According to their findings FDI affect environmental policy, and the effect is conditional on the local government’s degree of corruptibility. If the degree of corruptibility is

sufficiently high (low), FDI leads to less (more) stringent environmental policy, and FDI thus contributes leads to pollution heaven.

Azhar et al. 2007 have applied cointegration technique to test a long run relationship among the variables and error correction model to determine the short run dynamics of the system by using the time series data for Pakistan economy, over the period of 1972-2001. They find the existence of a cointegrating vector, indicating a valid long run relationship among the trade liberalization and environmental indictors.

Robert et al. 2008 investigate the relationship between outbound Japanese FDI and the relative stringency of environmental regulation between Japan and three near neighbors (Malaysia, Indonesia and the Philippines) using data between 1986 an 1998. They finds that the level of pollution abatement costs in a Japanese industry to be a generally statistically insignificant determinant of that industry’s FDI , providing evidence of an effect counter to the prediction of the PHH. However, in case of Philippines and Malaysia it appears that regulations in Japan acted as a deterrent to Japanese firms to invest abroad.

Overall Trade Policies and Performance

The overall trade policy of Pakistan was not consistent since its independence. Pakistan just after its independence during 1950’s adopted highly protected trade policies which were also prevailed throughout the world after world war second. The introverted i. e. high tariff and import substitution strategy were continued in 1960s as well as during1970s. The 1980s Pakistan switched from inward looking import substitution policy to

the outward oriented strategy of export promotion through liberalization of trade and financial markets (Government of Pakistan, 2006).

The overall performance of manufacturing sector was significant in 1960s which resulted in high growth rate. Unlike 1960 in 1970s manufacturing sector performed poorly due to nationalization policies coupled with high protection and as well high production costs, resulted in low productivity, therefore, they were not able to exposure international market. All these policies were adopted in contrast of the well recognized work of Smith (1776), Heckschor (1919) and Ohlin (1933), Samuelson (1948 and 1949), that trade liberalization leads to accelerate economic growth. Which were latterly also supported by Blodwin (1984), Romer (1986), and Locus (1988).

In 1980’s Pakistan has initiated to replace the inward looking import substitution policy to the outward oriented strategy of export promotion. This was supplemented through trade and financial liberalization, resulted in achieving high manufacturing sector growth (average 8%) as well as impressive average 6. 5% GDP growth. Although, the liberalization policies were continued but the momentum of economic growth was lost in 1990s due to political instability. Industrial and trade performance remained depressed and the average annual GDP rate fell to 4. 5% in the 1990s as of 1980’s. The average annual growth rate of manufacturing sector also decreased from 8. 2% to 4. 8% during the period. The share of manufactured products in total exports, however, continued to rise and jumped from 45% and 62% in 1980 and in 1995-96, respectively (Qureshi, 2006 and Government of Pakistan, 2007).

Pakistan has an impressive performance during the earlier and mid of 2010 decade with exports growing at an average rate of almost 16% per annum over the last four years (2002-03 to 2005-06). During this period, Pakistan had recorded good economic performance, with GDP was growing at the average of 7%. Whereas international trade was grow at more than 15% per annum during the period. Pakistan exports were highly converted in a few items namely cotton, leather, rice, and synthetic items and sports goods. These five categories of exports account for 77. 2% of total exports during the year 2006-07 with cotton manufactures alive contributing 61. 5% followed by Leather 4. 5%, rice 6. 6%, synthetic textile 3% and sports goods 1. 6% Table 1(Government of Pakistan, 2007).

Table 1. Pakistan's major exports (% share)

Commodity	**92 -93**	**94 -95**	**96 – 97**	**98 -99**	**99 -00**	**00 -01**	**01 -02**	**02 -03**	**03 -04**	**04 -05**	**05 -06**	**06 -07***
Cotton manufacturers	59. 8	58. 7	61. 3	59. 1	61							

58. 9

59. 4

63. 3

62. 3

57. 4

59. 4

61. 5

Leather

9. 3

8

7. 7

6. 9

6. 3

7. 5

6. 8

6. 2

5. 4

5. 8

6. 9

4. 5

Rice

4. 7

5. 6

5. 6

6. 9

6. 3

5. 7

4. 9

5

5. 2

6. 5

7

6. 6

Synthetic Textiles

7. 4

7. 1

6. 1

5. 1

5. 3

5. 9

4. 5

5. 1

3. 8

2. 1

1. 2

3

Sports Goods

1. 9

3. 2

3. 7

3. 3

3. 3

2. 9

3. 3

3

2. 6

2. 1

2. 1

1. 6

Sub Total

83. 1

82. 6

84. 4

81. 3

82. 2

80. 9

78. 9

82. 6

79. 3

73. 9

76. 6

77. 2

Others

16. 9

17. 4

15. 6

18. 7

17. 8

19. 1

21. 1

17. 4

20. 7

26. 1

23. 4

22. 8

Total

100

100

100

100

100

100

100

100

100

100

100

* July-March (provisional)

Source: Government of Pakistan, 2007.

The USA, UK, Germany, Japan, Hong Kong, Dubai and Saudi Arabia are the major export market for Pakistan. Whereas, the United States was the single largest export market for Pakistan, accounting for 28. 4 percent of its exports followed by U. K, Germany and Japan in the year 2006-07. For detail refer to Table 2 (Government of Pakistan, 2007).

Table 2. Major exports markets of Pakistan (% Share)

Country

92-93

94-95

96-97

98-99

99-00

00-01

01-02

02-03

03-04

04-05

05-06

06-07*

USA

13. 9

16. 2

17. 7

21. 8

24. 8

24. 4

24. 7

23. 5

23. 9

23. 9

25. 5

28. 4

Germany

7. 8

7

7. 5

6. 6

6

5. 3

4. 9

5. 2

4. 9

4. 8

4. 2

4. 1

Japan

6. 8

6. 7

5. 7

3. 5

3. 1

2. 1

1. 8

1. 3

1. 1

1. 1

0. 8

0. 8

UK

7. 1

7. 1

7. 2

6. 6

6. 8

6. 3

7. 2

7. 1

7. 6

6. 2

5. 4

5. 8

Hong Kong

6. 6

6. 6

9. 4

7. 1

6. 1

5. 5

4. 8

4. 6

4. 7

3. 9

4. 1

4

Dubai

5. 9

4

4. 6

5. 4

5. 7

5. 3

7. 9

9

7. 3

3. 3

5. 6

4

Saudi Arabia

4. 7

2. 7

2. 6

2. 4

2. 5

2. 9

3. 6

4. 3

2. 8

2. 5

2

1. 8

Sub Total

52. 8

50. 3

54. 7

53. 4

55

51. 8

54. 9

55

52. 3

45. 7

47. 6

48. 9

Other Countries

47. 2

49. 7

45. 3

46. 6

45

48. 2

45. 1

45

47. 7

54. 3

52. 4

51. 1

Total

100

100

100

100

100

100

100

100

100

100

100

100

* July-March (provisional)

Source: Government of Pakistan, 2007.

Pakistan’s imports are also highly concentrated in few items namely, machinery, petroleum & petroleum products, chemicals, transports equipments, edible oil, iron & steel, fertilizer and tea. These eight categories of imports accounted for 72. 5 percent of total imports during 2005-06 against 78. 5 percent in the year 1992-93. Among these categories machinery, petroleum & petroleum products and chemicals accounted for 53. 4 percent of total imports. Concentration of imports remained, by and large unchanged over the last one decade with the exception of 2000-01.

Pakistan major exports are presented at Table 3 (Government of Pakistan, 2007).

Overtime there was no significant change in the composition of Pakistan’s imports. Among the total imports, the share of raw materials for consumer goods continued to be high while that for capital goods remained stagnant (Table 4). Like exports, Pakistan’s imports are also highly concentrated in few countries. USA, Japan, Kuwait, Saudi Arabia, Germany, the UK and Malaysia contribute over 40 percent of total Pakistan’s import. Saudi Arabia is emerging as major suppliers to Pakistan followed by the USA and Japan. Major sources of imports are presented at Table 4 (Government of Pakistan, 2007).

Table 3. Pakistan's major Imports (% share)

Commodities	**92-93**	**94-95**	**96-97**	**98-99**	**99-00**	**00-01**	**01-02**	**02-03**	**03-04**	**04-05**	**05-06**	**06-07***
Machinery**	24. 3	22. 8	23. 1	17. 9	13. 9							

19. 3

17. 1

18. 5

17. 8

22. 5

18

22. 5

Petroleum & Products

15. 5

15. 3

19

15. 5

17. 5

31. 3

27. 1

25. 1

20. 3

19. 4

22. 3

22. 5

Chemicals*

12. 5

14

13. 4

16. 6

5. 5

20

15. 9

15. 1

16. 1

15. 5

13. 4

12. 7

Transport equipments

12. 5

5. 9

4. 7

5. 7

5. 5

4

4. 8

5. 6

506

6. 2

7. 7

8

Edible oil

5. 9

9. 6

5. 1

8. 7

4

3. 1

3. 8

4. 8

4. 2

3. 7

2. 7

2. 9

Iron & steel

3. 2

3. 6

3. 9

3. 1

3

2. 6

3. 3

3. 3

3. 3

4. 3

5. 1

5

Fertilizer

2. 5

1. 2

3. 2

2. 8

1. 9

1. 6

1. 7

2. 1

1. 8

2

2. 4

1. 2

Tea

2. 1

1. 8

1. 1

2. 4

2

1. 9

1. 5

1. 4

1. 2

1. 1

0. 9

0. 7

Sub-Total

78. 5

74. 2

73. 5

72. 7

75

83. 8

75. 2

75. 9

70. 3

74. 7

72. 5

75. 5

Others

21. 5

25. 8

26. 5

27. 3

25

16. 2

24. 8

24. 1

29. 7

25. 3

27. 5

24. 5

Total

100

100

100

100

100

100

100

100

100

100

100

100

* July-March (provisional),

**Excluding transport equipments, @ Excluding fertilizer

Source: Government of Pakistan, 2007.

Table 4. Major sources of imports (% share)

Country

92-93

94-95

96-97

98-99

99-00

00-01

01-02

02-03

03-04

04-05

05-06

06-07*

U. S. A

9. 4

9. 4

12

7. 7

6. 3

5. 3

6. 7

6

8. 5

7. 6

5. 8

8. 1

Japan

15. 9

9. 6

8. 6

8. 3

6. 3

5. 3

5

6. 6

6

7

5. 6

5. 7

Kuwait

3. 3

5. 8

6. 9

5. 9

12

8. 9

7. 1

6. 6

6. 4

4. 6

6. 2

5. 4

S. Arabia

5. 4

4. 9

6

6. 8

9

11. 7

11. 6

10. 7

11. 4

12

11. 2

11. 5

Germany

7. 4

6. 8

5. 6

4. 1

4. 1

3. 5

4. 3

4. 6

3. 9

4. 4

4. 7

4. 1

U. K

5. 2

5. 1

5

4. 3

3. 4

3. 2

3. 4

2. 9

2. 8

2. 6

2. 8

2. 3

Malaysia

5. 1

8. 8

4. 7

6. 7

4. 3

3. 9

4. 4

4. 6

3. 9

2. 6

3

3

Sub-Total

51. 7

50. 4

48. 8

43. 8

45. 4

41. 8

42. 5

42

42. 9

40. 8

39. 3

40. 1

Other countries

48. 3

49. 6

51. 2

56. 2

54. 6

58. 2

57. 5

58

57. 1

59. 2

60. 7

59. 9

Total

100

100

100

100

100

100

100

100

100

100

100

100

Source: Government of Pakistan, 2007.

3. Environmental Profile of Pakistan

Pakistan has the fourteenth highest birth rate of increase among countries with more than one million people. Among the nine more populous countries in the world, ranking thirty second in the world in land size is expected to become the eight populous countries by 2010. Pakistan covers only 0. 67% of the world land and 2% of world people (The World Bank, 2006).

Pakistan is the most urbanized country in South Asia with a population rate of 3. 1% per annum with average GDP growth of 4. 5% per annum has adverse effect on natural resource stock and environmental absorptive capacity. Pakistani cities are facing problems of urban congestion, deteriorating air and water quality and waste management while the rural areas are witnessing rapid deforestation, biodiversity and habitat loss, crop failure, desertification and land degradation.

Environmental degradation is highly visible in Pakistan-water and air pollution, land degradation are widespread. There are three main sources of water pollution bacterial and organic liquids and solids from urban and rural domestic sewage, toxic metals, organics, acids and other less-toxic. Pakistan generates 34, 370 wet tones of excreta per day, 12. 5 million tones per year. Karachi which is the largest city of Pakistan alone discharges approximately 300 million galleons per day of sewage, Lahore approximately 240 million gallons (GOP/IUCN, 1992).

The major industries creating environmental hazards are the manufacture of chemicals, textiles, pharmaceuticals, cement, electrical and electronic equipment, leather tanning, food processing, and petroleum refining. Pollutants associated with various industrial sub sectors are shown in Table 5 (GOP/IUCN, 1992).

Table 5. Selected pollutants associated with industry

INDUSTRIAL SUBSECTOR

POTENTIAL POLLUTANTS*

Chemicals

Sulphuric and nitric acids, Ammonia, fluorocarbons

Pesticides

Organohalogens, organophosphates other toxic organic, arsenic

Textiles

Hydrochloric, sulphuric acids, high BOD (organic content), dye, various organic chemicals and detergents

Pharmaceuticals

Ammonia, acids, Zinc

Leather tanning

Heavy metals (chromium, cadmium, etc.) various organic chemicals, acids, high BOD

Food processing

Ammonia, sulphur dioxide

Cement

Alkalines, Limestone dust

Electrical /Electronics

Fluorocarbons, heavy metals (including cadmium, nickel, Selenium)

Glass/ Ceramics

Arsenic, fluorine

Petroleum refining

Phenols, sulphides, oily residues, ammonia

Plup and Paperboard

Mercaptans (organic sulphides) high BOD and organic solids, mercury

*Quantities and characteristics dependent on type if manufacturing process and whether waste treatment exists

Source: GOP/IUCN, 1992.

Pakistan is the most urbanized country in South Asia, where 35% of its population living in cities while urban air pollution remains as the most significant environmental problems facing the cities. The major source of air pollution is the factory smoke followed by vehicles, power plants, with the passage of time the combined emissions of air pollutants from industries, Power generation, transportation, domestic activities, and agriculture and commercial institutions are growing rapidly. The average increase in (SO2) was twenty three fold and that in carbon dioxide (CO2) emissions was fourfold from 1977-78 to 1997-98 (Table 6).

Table 6. Estimated air pollutants from various economic sectors

Sector

1977-78

1987-88

1997-98

CO2

SO2

NOX

CO2

SO2

NOX

CO2

SO2

NOX

Industry

12308

19

n/a

26680

423

n/a

53429

982

n/a

Transport

7068

52

n/a

10254

57

n/a

19987

105

n/a

Power

3640

4

3

11216

95

n/a

53062

996

76

Domestic

16601

5

n/a

24054

16

n/a

3998

40

n/a

Agriculture

845

5

n/a

4490

28

n/a

6368

40

n/a

Commercial

1726

11

n/a

2587

13

n/a

4261

25

n/a

Source: Government of Pakistan, 2001.

The most comprehensive and widely quoted measure is the Environmental Sustainability Index (ESI), a collaborative venture of the Yale centre of Environmental Law and Policy and CIESIN at the Columbia University (The World Bank, 2006). ESI is a composite index of 21 indicators that cover five broad categories of environmental pressure. According to (ESI) Bhutan

scores the highest in South Asia and Pakistan scores the lowest ESI in South Asia (Table 7).

Table 7. ESI is a composite index of 21 i