

Multinational Corporations and Their Effects on Environment: Pollution Haven Hypothesis Testing in the Case of Turkey

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ABSTRACT

The pollution haven hypothesis refers to the idea that the highly pollution-intensive industries will relocate their activities from developed economies to the developing world. It is argued that the environmental concerns of the developed economies have caused them to enact strict environmental regulations, which have increased the cost of production of the dirty industries at home. The aim of this paper is to discuss the “pollution haven hypothesis” in the light of a comprehensive analysis of MNCs in Turkey. In order to test the hypothesis, dirty and clean industries are determined in the manufacturing industry. Multinational corporations are examined with reference to their sectors and their countries. The results of this empirical study provide significant evidence for the pollution haven hypothesis in Turkey.

Keywords: *Pollution haven hypothesis, multinational corporations, foreign direct investment, Turkey.*

1. INTRODUCTION

Foreign direct investment (FDI) and especially foreign investment dependencies of less developed world are mostly emphasized in academic research areas nowadays. Because international capital movement has become the main vehicle for economic globalization, FDI has locked economies across the world together. A key element in understanding this has been the notion that growth in the less developed world was dependent on trade and foreign capital from developed countries (Kentor, 1981; Fuchs & Pernia, 1989; Eng, 2007). Dependency theory is refined by an influential conceptual innovation, the new international division of labor. Financial functions, headquarters of multinational companies (MNCs), research & development (R&D)

and other high levels of services are increasingly concentrated in a few influential nodes in the developed world, while the more unskilled manufacturing is transferred extensively to developing countries (Cohen, 1981; Fröbel et al., 1980). The crucial point here is that these unskilled manufacturing activities are also generally pollution-intensive industries.

Moreover, current studies focus on the question of “Does FDI negatively affect environments in less developed countries?” (Grimes & Kentor, 2003; Jorgenson, 2007a, 2007b; Jorgenson & Kuykendall, 2008; Jorgenson et al., 2007; Roberts et al., 2003). The answer to this question is vague. The findings of some of these studies have shown that negative impacts of foreign investment on the environment increase

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gradually. One of the key– assumptions of these studies– though sometimes unstated– is that foreign investment is attracted to countries with fewer environmental regulations. However, this question brings to mind the idea of “pollution haven hypothesis” (PHH) (Walter & Ugelow, 1979).

Although there is a growing literature on the determinants of global environmental quality, little research has been done to test the PHH. Moreover, empirical studies in sociology, political science, and economics have shown inconsistent results for this hypothesis (Clapp, 1998; Frey, 2003; Grossman and Krueger, 1993; Thompson & Strohm, 1996 cited in Dick, 2010). To resolve this theoretical ambiguity, the aim of this study is to discuss the “pollution haven hypothesis” in the light of a comprehensive analysis of MNCs in Turkey. The remainder of the paper is organized as follows. Section 2 presents a brief literature review, concentrating on prior studies attempting to address endogeneity concerns. Section 3 describes the empirical methodology used in this study. Section 4 discusses the results and discussion, and finally Section 5 is the conclusion.

2. POLLUTION HAVEN HYPOTHESIS AND FDI

The PHH argues that industries that are highly pollution-intensive, like dirty industries, will relocate their activities from developed economies to the developing world. In other words, PHH predicts that firms active in sectors with high pollution intensity, and operating in countries where more restrictive policies are in practice, will transfer their production abroad, and will serve the domestic markets from these new foreign plants (Akbovstanci, Turut & Asik, 2004; Copeland & Taylor, 1994, 1995, 2003, 2004). As environmental policy becomes more restrictive with economic growth (being the environment a normal good), it is expected that in highly polluting sectors production will move from developed to developing countries.

The term ‘pollution haven’ is first used by Walter and Ugelow (1979) to explain how “by having fewer pollution control costs to pass along, suppliers of internationally traded products in developing countries should be able to achieve a competitive advantage over their industrial-country rivals in certain product lines” (Walter & Ugelow, 1979:103). They further argue that environmental quality is a function of the income of a country, meaning that environmental regulation is in essence a luxury good. Thus, less-developed countries are likely to have fewer environmental regulations. The importance of this hypothesis for foreign investment is relatively clear. If a corporation can save money by locating in a country with lesser environmental regulations, it is rational for them to do so (Walter & Ugelow, 1979).

The PHH debate regarding empirical studies began in the 1990s, when NAFTA was launched (Grossman & Kruger, 1995). The discussion at the time centered on the possibility that firms in pollution-intensive sectors

would migrate from US and Canada, moving production to Mexico. The debate has recently been revived with the EU adopting unilaterally more restrictive environmental policies. “The Spring 2007” European Council decided that the EU should maintain the international leadership in facing climate change challenges, agreeing upon binding targets to reduce greenhouse gas emissions by 20% by 2020 compared to 1990, and adopting targets on renewable energy and energy efficiency. Actually, a vast literature has dealt with the possibility of “pollution havens” parallel to these arrangements at the international level, and most of these studies analyze the interaction of trade and environment (Copeland & Taylor, 1994, 1995, 2003, 2004), without taking into account the phenomenon of FDI. Moreover, while theoretical research converges on the prediction of a shift in production from developed to developing countries in pollution-intensive sectors, some of the empirical research has not supported such a prediction. The crucial question here is: Is “pollution havens” a paradox or not?

Sanna-Randaccio and Sestini (2011) give a clear illustration of the logic steps in the PHH (Figure 1). The black (thin) arrows in Figure 1 represent the causation mechanism highlighted by Taylor (2006). As environmental regulations become tighter with economic growth, country characteristics influence environmental policy, which in turn affects trade and FDI by increasing production costs. Environmental regulations are considered in many studies as the sole determinant of location. On the other hand, Sanna-Randaccio and Sestini (2011) have suggested some additions for Taylor’s figure (see the red (thick) arrows in Figure 1). According to them Taylor’s (2006) scheme loses some essential ingredients and thus should be enriched adding the links denoted by the red (thick) arrows. In order to understand the effect of environmental regulations on trade and FDI flows, they should account for sector-specific characteristics and furthermore for the interaction of sector-specific and country characteristics which determine the extent of firms’ geographical mobility (as indicated by the red (thick) arrows).

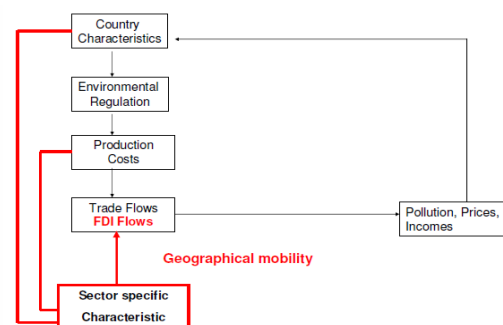


Figure 1. Unbundling the Pollution Heaven Hypothesis: the FDI story

Source: Sanna-Randaccio and Sestini, 2011

The key point here is that the influence of environmental measures on plant location is highly context-dependent. A large array of possibilities may emerge, depending on the parameters considered. The starting point is thus to identify the main features of pollution-intensive sectors, to define key stylized and empirically grounded facts on which to build a model (Sanna-Randaccio & Sestini, 2011).

Industries are classified as dirty and clean in the PHH, and there are different methods used in the literature to clarify “dirty” industries. According to the Mani and Wheeler (1997), the levels of abatement expenditure per unit of output is one of the useful criterion to clarify these industries. By this criterion, five sectors emerge as leading candidates for “dirty” industry status: Iron and

Steel, Non-Ferrous Metals, Industrial Chemicals, Pulp and Paper, and Non-Metallic Mineral Products (Robison, 1988; Tobey, 1990; Mani, 1996). Another criterion derived from different empirical studies is selecting sectors which rank high on actual emissions intensity (emissions per unit of output). To determine high-ranking sectors by this criterion, Mani and Wheeler (1997) have used detailed emissions intensities by medium for the U.S. manufacturing at the 3-digit Standard Industrial Classification (SIC) level, computed by the World Bank in collaboration with the U.S. EPA and the U.S. Census Bureau (Hettige, et. al., 1995). They have computed average sectoral rankings for conventional air pollutants, water pollutants, and heavy metals (Mani & Wheeler, 1997) (Table 1).

Table 1. Ranking of Pollution-Intensive Industries

Rank	Air	Water	Metals	Overall
1	371- iron and steel	371 - iron and steel	372 - non-ferrous metals	371 - iron and steel
2	372 - non-ferrus metals	372 - non-ferrous metals	371 - iron and steel	372 - non-ferrous metals
3	369 - non-metallic min. prd.	341 - pulp and paper	351 - industrial chemicals	351 - industrial chemicals
4	354 - misc. petroleum, coal prd.	390 - miscellaneous manufacturing	323 - leather prd.	353 - petroleum refineries
5	341 - pulp and paper	351 - industrial chemicals	361 - pottery	369 - non-metallic min. prd
6	353 - petroleum refineries	352 - other chemicals	381 - metal prd.	341 - pulp and paper
7	351 - industrial chemicals	313 - beverages	355 - rubber prd.	352 - other chemicals
8	352 - other chemicals	311 - food prd.	383 - electrical prd.	355 - rubber prd.
9	331 - wood productions	355 - rubber prd.	382 - machinery	323 - leather prd.
10	362 - glass productions	353 - petroleum refineries	369 - non-metallic min. prd	381 - metal prd.

Source: Mani and Wheeler, 1997:116.

All of these sectors are relatively intensive in capital, energy and land (Mani and Wheeler, 1997). The importance of capital intensity (and thus fixed plant costs) in these sectors is highlighted in several other studies (McKinsey & Company, 2006; Lundan, 2004; Cole & Elliot, 2005). In fact, firms in these sectors produce bulk commodities with a high weight/value ratio and are thus characterized by large transportation

costs (Anderson & Wincoop, 2004; Hummels, 2007 cited in Sanna-Randaccio & Sestini, 2011).

There are two critical decision processes in the PHH literature: choosing environmental policy (by governments) and deciding where to locate production (by firms). There is a vast literature on using one or both of these decisions. In some cases, strategic aspects of these decisions are explained and in others ignored

(Table 1). There is no doubt, in developing countries environmental policies of governments are less powerful from developed countries. Strategic environmental policy has lately attracted considerable attention of the researchers. The choice of environmental policy is endogenized, considering a non-cooperative game among governments, while often taking the international strategy of firms as exogenous (Bayindir-Upmann, 2003; Kayalica & Lahiri, 2005; Cole, Elliot & Fredriksson, 2006 cited in Sanna-Randaccio & Sestini, 2011). In a few studies, both governments and firms' decisions are treated as endogenous (Markusen, Morey & Olewiler, 1995; Rauscher, 1995; Ulph & Valentini, 2001).

3. METHODOLOGY

MNCs engaged in dirty and clean industries in manufacturing sector are the main concern of this study. A four steps analysis was realized in the empirical study (Table 2). The reason for this is that to support the PHH, the results of an empirical study should show that an increase in the dirty industries is greater than increase in the clean industries in time, and developed countries mostly invest in dirty industries rather than clean industries.

Dirty and clean industries were determined with reference to the levels of abatement expenditure and emissions per unit of output in the first step. The study of Akbostancı, Tunç and Aşık (2004) was the main source in this process. Dirty and clean industries were divided into two subgroups according to their degree of dirtiness; the dirtiest and less dirty for dirty industries and the cleanest and less clean for clean industries. These subdivisions of industries gave a chance to realize more detailed analyses and reach more reliable results. After this clarification, general structure of MNCs in Turkey was determined through time in the second step. Their home countries, sectors, amounts of capital and locations were explored from the 1960s up to 2014. Changes in the share of dirty and clean industries through time was analyzed in the third step. To test the PHH, this analysis was very important and historical analyses were made for both dirty and clean industries. According to the PHH, developed countries have a tendency to invest in dirty industries rather than clean ones. Therefore, changes in the share of dirty and clean industries by MNCs from developed countries was evaluated in the last step of the current empirical study.

Table 2. The Steps of the Empirical Study

	Aim	Methods	Data Source
1. step	Determination of dirty and clean industries in manufacturing industries	- the levels of abatement expenditure per unit of output - emissions per unit of output	World Bank statistics, The State Institute of Statistic's Industrial Waste Statistics in different years, and Akbostancı, Tunç and Aşık, (2004)
2. step	Description the general structure of MNCs in Turkey	Descriptive statistics on MNCs in Turkey from the 1960s to 2015 (~26,000 firms) (engaged sectors, home countries, invested capital, establishment years)	Undersecretariat of Treasury Turkish Republic and Ministry of Economy - in different years
3. step	Clarification of changes in the share of dirty and clean industries by time	Descriptive statistics on MNCs in Turkey from the 1960s to the end of 2014	Undersecretariat of Treasury Turkish Republic- in different years
4. step	Clarification of the relationship between developed country and dirty industry	Descriptive statistics on MNCs in Turkey from the 1960s to the end of 2014	Undersecretariat of Treasury Turkish Republic- in different years

4. RESULTS AND DISCUSSION

The analyses made in the four steps have yielded the following results.

1. Step: Determination of dirty and clean industries in manufacturing industries: In order to determine dirty industries, Akbostancı, Tunç and Aşık (2004) use the State Institute of Statistic’s Industrial Waste Statistics. There are basically two methods for classification of dirty industries in the literature. The first method measures the pollution content using pollution abatement and control expenditures (PACE), which capture the producer’s cost burden of pollution regulation. This approach identifies dirty industries as those with the highest PACE per unit of output. According to OECD (2003) data in Turkey pollution abatement costs as a sum constitute 1.1% of GDP (Akbostancı, Tunç & Aşık, 2004). However, pollution abatement cost data for Turkey at the industry level are

not available. The second measure of pollution intensity directly measures emissions for estimating the pollution intensity of production (Bommer, 1998). However, for Turkey this kind of data is not available, either. The only available data are the amount of waste produced by firms at the ISIC revision 2, in 4-digit detail. Yet, toxic content of this waste is unavailable. Therefore, based on this data, pollution indices were constructed and the shortcoming of the lack of toxic content of waste data was tried to overcome by using Linear Acute Human Toxicity Index as an additional source (Hettige, Martin, Singh & Wheeler, 1995 cited in Akbostancı, Tunç & Aşık, 2004).

In this study, dirty and clean industries (Table 3) were determined with reference to the study of Akbostancı, Tunç and Aşık, (2004) and recent statistical data of World Bank and The State Institute of Statistic’s Industrial Waste Statistics.

Table 3. Classification of Dirty and Clean Industries

DIRTIEST	CLEANEST
3512- Fertilizers and nitrogen compounds	3825- office, accounting and computing machinery
3720- Basic precious and non-ferrous Metals	3119- cocoa, chocolate and sugar Confectionery
3813- Structural metal products	3551- rubber tyres and tubes; retreading
3511- Basic chemicals, except fertilizers and nitrogen compounds	3821- engines and turbines, except aircraft, Vehicle and cycle engines
3710- Iron and steel	3832- radio, television and communication Equipment and apparatus
3411- Paper and paper products	
Less DIRTY	Less CLEAN
3691- refractory ceramic products	3523- soap and detergents, cleaning and polishing preparations, perfumes and toilet product
3699- other stone and soil products	3831- electrical equipment
3311- sawmilling and planing of wood	3839- other electrical equipment n.e.c
3692- cement, lime and plaster	3901- jewelery and related articles
3819- other fabricated metal products	

Source: Adopted from Akbostancı, Tunç and Aşık (2004)

2. Step: Description of the general structure of MNCs in Turkey: At the beginning of this step, the general structure of FDI in Turkey was briefly clarified. There are 45821 MNCs in Turkey in 2015 and 91.7% of these MNCs invested in the country after the 2000s (Table 4). Turkey have started to implement liberal policies after

the 1980s and especially after the 2000s new arrangements have taken place for free trade. Thus, this increase in the number of MNCs can be related all these policies of Turkish governments.

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Table 4. Classification of MNCs in Turkey by year

Periods	Number of newly established MNCs	Share in total MNCs (%)
1950-1960	25	0.05
1961-1970	32	0.07
1971-1980	18	0.04
1981-1990	1249	2.73
1991-2000	2467	5.38
2001-2010	21783	47.54
2011-2015	20247	44.19
Total	45.821	100.0

Source: Ministry of Economy, www.economy.gov.tr, 12/05/2015

Istanbul is the mostly invested city in the country in all years (Table 5). Its market potentials, transportation facilities and cultural, historical and natural values attract MNCs. Istanbul was followed by a tourism city Antalya, with the capital city Ankara in the third order. The locational preferences of MNCs show that locations with huge market, industrial and/or agricultural potentials and coastal areas are generally selected by MNCs in Turkey.

Table 5. Distribution of MNCs in Turkey by Invested Cities (2015)

City	Number of MNCs (1954-2015/September)
Istanbul	27562
Antalya	4639
Ankara	2639
Izmir	2205
Muğla	1564
Mersin	1277
Gaziantep	761
Bursa	639
Aydin	613
Hatay	478
Other Cities (Total)	3444
Total	45821

Service sector is mostly invested sector in Turkey (47.60%) (Table 6). This is a general trend all over the world, as a result of the increase in the importance of white collar jobs in globalized world. On the other hand, the share of manufacturing industry that is the main focus of this study is in the second order with 35.20% after service sector.

Table 6. Sectoral Distribution of MNCs in Turkey-2015

Sector	2015 (Million \$)	Share %
Agriculture	25	0.28
Mining	193	2.20
Manufacturing	3150	35.20
Energy	1321	14.80
Service	4262	47.60
Water supply waste mang.	2	0.00
Total	8953	100.00

Source: Ministry of Economy, www.economy.gov.tr, 12/05/2015

In the PHH, dirty investments must come from developed countries; for this reason, home countries of MNCs in Turkey were identified (Table 7). Approximately 60% of MNCs are from European and North American countries, and 10% are from other developed countries. MNCs in Turkey are mostly from developed countries.

Table 7. Home Countries of MNCs in Turkey (1954-2015)

Countries	Number of MNCs	Share in Total (%)
EU Countries	20348	44.41
Germany	6366	13.89
The Netherlands	2557	5.58
United Kingdom	2880	6.29
Italy	1287	2.81
Other EU Countries	7258	15.84
Other European Countries	4602	10.04
Africa Countries	1531	3.34
North America	1914	4.18
U.S.A.	1596	3.48
Canada	318	0.69
Central and South America, Caribbean	234	0.51
Near and Middle East Countries	13437	29.32
Other Asia	3304	7.21
China	722	1.58
South Korea	275	0.60
Other	2307	5.03
Other Countries	451	0.98
Total	45821	100.00

Source: Ministry of Economy, www.economy.gov.tr, 12/05/2015

3. Step: Clarification of changes in the share of dirty and clean industries through time

This step focused on changes in the number and invested capital of MNCs engaged in dirty and clean industries in different periods (Table 8). The share of the dirtiest industries investments is 40.9% and less

dirty investments is 59.1% in all other dirty industry investments by MNCs in 2015. "Basic chemicals, except fertilizers & nitrogen compounds" (sector code: 3511) has the highest ratio among other sectors in the dirtiest sectors group with 13.6%. On the other hand, "other stone and soil products" (sector code: 3699) is in the first rank in less dirty sectors with 39.8%.

Table 8. The Share of Dirty Industry Investments of MNCs by Sectors (2014)

Sectors		Share in Total dirty investments
Dirtiest	3511- Basic chemicals, except fertilizers & nitrogen compounds	13.6
	3710- Iron and steel	10.2
	3813- Structural metal products	8.1
	3720- Basic precious and non-ferrous metals	4.4
	3512- Fertilizers and nitrogen compounds	2.8
	3411 - Paper and paper products	1.9
Total		40.9
Less dirty	3699- Other stone and soil products	39.8
	3819- Other fabricated metal products	11.5
	3692- Cement, lime and plaster	4.4
	3691- Refractory ceramic products	1.9
	3311- Sawmilling and planing of wood	1.6
Total		59.1
General Total		100.0

Source: Adopted from www.hazine.gov.tr, 12/05/2015

While there is a decreasing trend in the dirtiest industries from the 1960s to the 2000s (from 12.5% to 6.2%), there is a slight increase in the less dirty industries through time from 5.9% before 1960 to 6.2% after the 2000s (Figure 2). When overall tendency is

considered, it is not wrong to say that the share of dirty industry investments of MNCs is rising through time in the country (from 11.8% before 1960 to 17% after the 2000s).

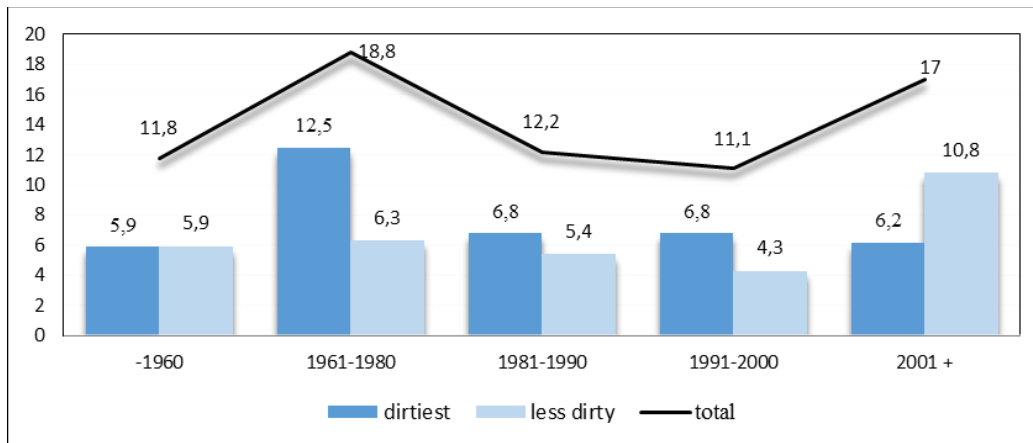


Figure 2. Changes in the Share of Dirty Industries in Total Manufacturing Industry Investments by Time (%)

Source: Adopted from www.hazine.gov.tr, 12/05/2015

The share of the cleanest industries is only 10.9% in total clean industry investments of MNCs in Turkey (Table 9). “Jewelry and related articles” (sector code: 3901) is mostly invested sector among less clean

industries with the 39.3% and “rubber tyres and tubes, retreading” (sector code: 3551) comes at the top among the cleanest industry investments of MNCs with 3.0%.

Table 9. The Share of Clean Industry Investments of MNCs by Sectors (2014)

Sectors		Share in Total clean investments
Less clean	3901- Jewellery & related articles	39.3
	3839- Other electrical equipment n.e.c	27.9
	3523- Soap & detergents, cleaning & polishing preparations, perfumes & toilet product	14.6
	3831- Electrical equipment	7.4
Total		89.1
Cleanest	3551- Rubber tyres & tubes; retreading	3.0
	3832- Radio, television & communication equipment & apparatus	2.7
	3825- Office, accounting & computing machinery	2.5
	3821- Engines & turbines, except aircraft, vehicle & cycle engines	2.2
	3119- Cocoa, chocolate & sugar confectionery	0.5
Total		10.9
General Total		100.0

Source: Adopted from www.hazine.gov.tr, 12/05/2015

There is a gradual increase in the less clean industries – from 0% before 1960 to 8.2% after the 2000s (Figure 3). On the contrary, the cleanest industry ratio is decreasing gradually from 11.8% to 8.9% in the same

period. When general tendency is analyzed the share of clean industry investments of MNCs is declining through time in the country (from 11.8% before 1960 to 8.9% after the 2000s).

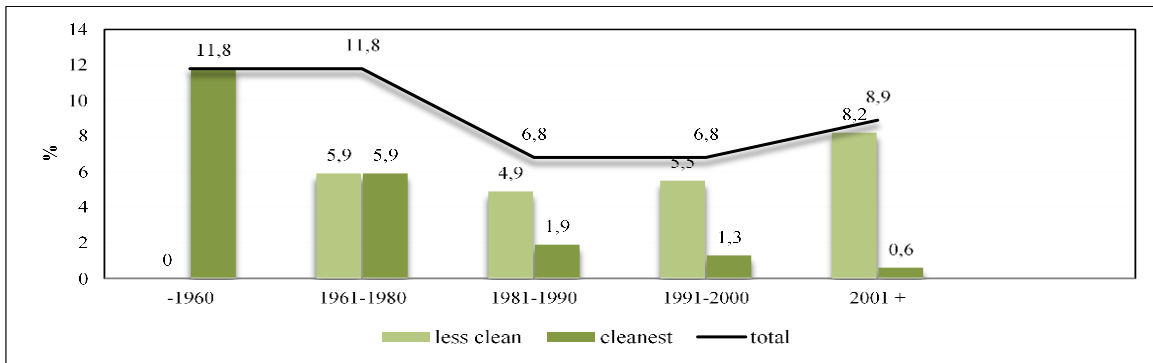


Figure 3. Changes in the Share of Clean Industries in total Manufacturing Industry Investments by Time (%)

Source: Adopted from www.hazine.gov.tr, 12/05/2015

In order to test the PHH, there is a need for comparing changing shares of dirty and clean industry investments in the country. The ratio of all clean industries in total manufacturing industry investments has been decreasing gradually through time (Figure 4). While the ratio of these sectors is 11.8% before 1960, and it is 8.9% after 2000. Parallel changes do not exist for the

dirty industries. The ratio is 11.8% before 1960, 17.0% after 2000. It is known that to support the PHH, the results of an empirical study should show that the increase in the dirty industries should be greater than increase in the clean industries. Therefore, in terms of changes in the share of dirty and clean industries, the current empirical study supports the PHH.

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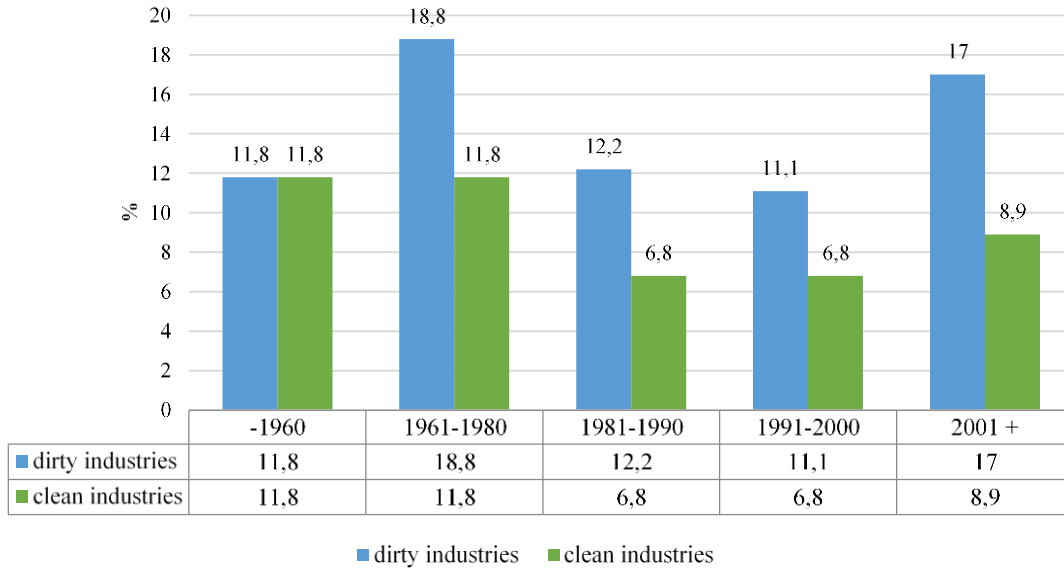


Figure 4. Changes in the Share of MNCs in Dirty and Clean Industries through Time (%)

Source: Adopted from www.hazine.gov.tr, 12/03/2015

5. Step: Clarification of the relationship between developed country and dirty industry

The PHH argues that industries that are highly pollution-intensive like dirty industries will relocate

their activities from developed economies to the developing world. To test the hypothesis in this step, further analyses were made for the investments of MNCs from developed countries (Figure 5).

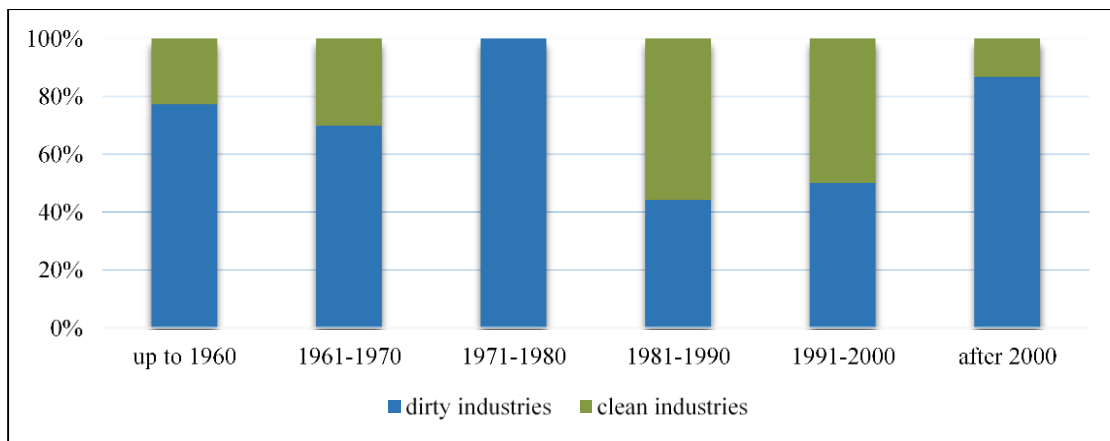


Figure 5. Distribution of Dirty and Clean Industry Investments from Developed Countries by Time (%)

Source: Adopted from www.hazine.gov.tr, 12/03/2015

MNCs that are from developed countries have a tendency to invest dirty industries rather than clean industries. In contrast to the decreasing trend between 1981 and 2000, there is a sharp rise in the share of dirty industry investments after 2000. This step of the empirical study also shows an evidence for the PHH in Turkish case.

5. CONCLUSION

The PHH is the idea that the industries that are highly pollution-intensive like dirty industries will relocate their activities from developed economies to the developing world. It is argued that the environmental concerns of the developed economies have caused them

to enact strict environmental regulations, which have increased the cost of production of the dirty industries at home. The aim of this paper is to discuss the “pollution haven hypothesis” in the light of a comprehensive analysis of MNCs in Turkey.

To test the PHH, Turkey makes a suitable research field. Since some of the previous studies related to MNCs in the country show that negative effects of these investments in terms of environment, development of R&D activities and urban sprawl (Akboştañcı, Tuñç & Aşık, 2004; Sat, 2011a, 2011b). The current study supports all these previous studies’ arguments and provides some important evidence in the PHH for Turkey.

According to the results of this study, the share of dirty industry investments of MNCs is rising in the course of time in Turkey (from 11.8% before 1960 to 17% after the 2000s). The share of clean industry investments of MNCs, on the other hand, is declining through time (from 11.8% before 1960 to 8.9% after the 2000s). Furthermore, MNCs that are from developed countries have a tendency to invest dirty industries rather than clean industries. There is a sharp rise in the share of dirty industry investments after 2000. In sum, increase in the ratio of dirty industries is greater than the increase in the ratio of clean industries, and developed countries have a tendency to invest dirty industries rather than clean industries in the country.

Although this study does not focus on the relationship between environmental policies of Turkey and MNCs dirty investments, Turkish environmental policies seem to be far from global environmental standards and to limit these types of dirty investments. Especially some of the investment incentives given by Turkish government are directly related with dirty industries. To overcome negative environmental effects of MNCs, these incentives should not include these dirty industries.

The PHH is a very important subject for academic investigation, and it needs further analytical studies, the focus of which should be the relationship between environmental regulations of governments and MNCs’ dirty investments. Finally, more clear results about the PHH could be obtained through advanced statistical analyses on the hypothesis.

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