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Master's Thesis

Graduation Session September/October-2022

Department of Engineering Management & Production (DIGEP)

Foreign Direct Investment and The Environment

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Acknowledgment

First , i would like to show appreciation to my supervisor Prof. Anna D'Ambrosio. This thesis would not have been finished if it weren't for her help and committed participation in each and every step of the procedure. Please accept my sincere gratitude for your help and patience over the past couple of months. Whenever I had a problem or a query regarding my research or writing, the door to the professor's office was always open. She regularly let me to write this thesis on my own, but guided me always when she felt I needed it.

I have a huge list of individuals to thank for their patience with me over the past years, as finishing my studies required more than just academic help.

Most significantly, without my family, none of this would have been possible. My parents, my sister and my brother-in-law and my two little nephew and niece , who, while living far away from me, have always been there for me and whose emotional presence has prevented me from feeling their absence over the course of my studies.

I owe a debt of gratitude to my friends and coworkers since we have always taken care of each other through the tough times and persisted together, sharing many good moments and memories along the way. Being unappreciative at this time would be unfair. I would like to appreciate my close friends Ahmad Arif , Abdullah Ashfaq, Mian Hassan Ijaz, Tabin Haider , Rocco Pisto , Luca Fontana, Federico Pulinas and Nicolo Marini with whom i had great memories and for their continuous support and encouragement throughout my years of study.

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Abstract

Many countries developed Special Economic Zones (SEZs) as test sites for the implementation of liberal market economy concepts. SEZs main purpose is to create jobs, substitute imported products to localized ones, and bring foreign exchange in countries. These are however perceived as macroeconomic tools for increasing the acceptability and legitimacy of industrial transformation strategies, attracting capital inflows, and facilitating liberalization. These SEZ are a great way to attract Foreign direct investment as these zones are subjected to policies which are beneficial for the investors. The objective of this thesis is to find the link between FDI and the pollution externalities (i.e. CO2 emissions). The focus is to study the Special Economic Zones in Pakistan created from the beginning till now and see the CO2 and CO emissions rise in the past couple of year and perform the regression analysis to comprehend either they are co-related or not. The first month of the thesis was utilitzed to learn the software ARCGIS Pro from different sources such as coursera, Youtube and linkedIn as the initial step was to graphically represents the SEZ on this software. Later to plot the CO2 and CO emission data on it, NASA earth science data website was utilized to gather the emissions data . The Goddard Earth Sciences Data and Information Services Center (GES-DISC) created Giovanni, a Web-based tool that offers a straightforward and user-friendly approach to explore, analyze, and retrieve enormous volumes of Earth science remote sensing data. The data was downloaded in (.PNG) format and to be accessible through ARCGIS , a raster layer was created which then graphically represented the amount of emission on the existed layer. A detailed description of all the work will be

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discussed in the following chapters. All this data contributed to generate the attribute table which includes all the information regarding the SEZ, their location and the amount of emissions in all the zones.

In the final phase of thesis, I learnt to use the software Stata IC and it is used to perform the regression analysis.

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Introduction

Foreign Direct Investment (FDI) is typically thought to play a crucial role in the economic development of all nations operating in the open market[1], particularly emerging ones. It serves as a magic bullet for escaping the vicious cycle of low savings/poor income and makes it easier to import capital goods and cutting-edge technological expertise.

The greatest FDI beneficiaries globally continue to be developing nations, despite the fact that they produce significant and steadily rising FDI inflows. Developing nations run the risk of getting stuck in relatively low value added industries if they don't integrate the global value chain activities. Because of this, these nations must carefully consider the benefits and drawbacks of integrating global value chains and decide whether to strategically promote or discourage FDIs in order to ensure coordinated economic, social, and environmental advancement in order to achieve sustainable development.

Controversial theories have been developed as a result of research on the connection between FDI and the environment (and more especially, pollution). The **Pollution Haven hypothesis**[2] states, first, that weak environmental laws in a host country (a developing one) can encourage foreign businesses from pollution-intensive industries looking to avoid expensive environmental compliance in their [developed] place of origin.

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[1] Open Market: A market that is open to competition has little to no restrictions on how businesses can operate.

[2] Pollution haven hypothesis: It demonstrates the idea that FDI increases carbon emissions because of lowering environmental standards in the nations where it invests.

In contrast, the **Factor Endowments theory** predicts that, under conditions of free trade and openness to FDI, MNCs[3] seeking low-cost locations will increase pollution levels in capital-intensive [rich] countries (capital-intensive activities are typically believed to be pollution-intensive).

[3] MNCs: Multinational corporations

Chapter 1 : Foreign Direct Investment

What is FDI?

Foreign direct investment (FDI) is defined by UNCTAD[4] (1999) as "an investment involving a long-term relationship and reflecting a lasting interest and control of a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor (FDI enterprise, affiliate enterprise, or foreign affiliate" The final definition uses the word "longterm" to set FDI apart from portfolio investment, which is distinguished by being short-term in nature and involving a large turnover of securities.

FDI's unique quality makes it stand out from other types of International investment is a factor in decision-making and management strategy. According to Razin et al. (1999), the aspect of control gives direct investors an informational advantage over foreign portfolio more domestic savings and investors. Many businesses are hesitant to conduct out unless they have full equity ownership and control, foreign investments. Others won't invest in these things until they have at least majority control (i.e., a 51% ownership interest). However, there has been a decline in recent years.

Increases in total factor productivity and, more broadly, resource usage efficiency in the receiving economy are two ways that foreign investment affects growth. This

[4] United Nation Conference on Trade and Development

operates through three different channels: the connections between FDI and foreign trade flows, spillover effects and other externalities on the business sector of the host nation, and direct effects on structural elements in the host market. Foreign investment appears to have a significant indirect effect on human capital in developing nations, with this influence coming more from government policies aimed at attracting FDI through improved human capital than through MNC initiatives. After someone is hired by a subsidiary of an MNC, their human capital may be further developed through training and on-the-job leadership. These subsidiaries could also boost human capital in other businesses they have connections with, such as suppliers (OECD,2002).

Foreign investment is frequently viewed as a potential tool by policymakers in some developing countries, particularly in those that are relatively less developed and only sporadically connected into global trade networks. According to the prevailing theory, MNCs may increase the domestic market's export orientation through channels such as their higher level of sophistication in product quality, brand recognition, and access to global markets; their potential to ease restrictions on using the host market's factor endowment; and their longer-term impact on the international competitiveness of the host economy's business sector.

There are three types of Foreign Direct Investment:

1-Horizontal FDI

The most prevalent kind of FDI is known as horizontal FDI, which focuses on investing money in a foreign business that is part of the same industry as the one in which the FDI

investor owns or operates. Here, a corporation invests in a company that is situated in a different nation and that manufactures comparable items.

2- Vertical FDI

Another form of foreign investment is vertical FDI. A vertical FDI takes place when an investment is made in a firm that may or may not be in the same sector, but is still part of a conventional supply chain. Therefore, when vertical FDI occurs, a company invests in a foreign company that may provide or sell items. Backward and forward vertical integrations are additional categories for vertical FDIs. Nescafe, a Swiss coffee manufacturer, may, for instance, invest in coffee farms in nations like Brazil, Colombia, Vietnam, etc. Backward vertical integration is the term used to describe this form of FDI since the investing business acquires from a supplier in the supply chain. A corporation is considered to engage in forward vertical integration when, on the other hand, it makes an investment in a foreign competitor that is further up the supply chain. For instance, an Italian coffee company would want to buy a French supermarket brand.

3-Conglomerate FDI

Conglomerate FDI refers to transactions in which investments are made in two wholly different businesses operating in completely distinct industries. As a result, the FDI is not directly related to the investor's enterprise. Walmart, a US retailer, may, for instance, invest in the automotive industry.

FDI and CO_2

Regarding foreign direct investment (FDI), emerging nations have attracted a lot of interest. However, due to the enormity of the CO_2 emissions in these economies, it is now urgent to find a solution, FDI is still growing. The percentage of CO_2 emissions from the percentage of emerging markets increased from 48% in 1980 to 61% in2011.[i]

More CO_2 emissions from the host country could result from FDI entry especially for those nations that desperately need economic growth and a softening of environmental laws in to bring in foreign investment. On the other hand, Inflow of FDI may also result in beneficial knowledge transfer and spillovers, boost energy efficiency, and lower CO_2 emissions in the host countries. How might FDI be attracted to create a situation where carbon reduction and economic growth are mutually beneficial? It is crucial to comprehend the intricate relationships that exist between FDI inflows and CO_2 emissions in order to more effectively respond to these problems.

Scholars have concentrated on the relationship between FDI inflows and CO_2 emissions and apparently the scholars can be categorized into two groups; optimistic and pessimistic.

Pessimism is the first point of view. The pollution haven theory put forth by Walter and Ugelow (1979) and Pethig provided the early evidence in support of this viewpoint (1976). According to the pollution haven theory, some industries with high levels of contamination and consumption would be moved from other countries through FDI, leading to a significant rise in pollutant emissions because host countries'

environmental standards. A large number of studies have confirmed that FDI inflows excalates environmental pollution.

The pollution halo hypothesis (Birdsall and Wheeler, 1993), which represents the other perspective, is optimism. In light of this supposition, it is commonly agreed that multinational corporations that engage in FDI can provide high standards of production patterns and cutting-edge technology to the host nations, helping to reduce local pollution emissions. Pao and Tsai (2011)[ii] came to the conclusion that FDI inflows will contribute to reducing CO2 discharges in emerging markets after examining the impact of FDI on CO2 concentrations. Using a quantile regression technique, Zhu et al. (2016)[iii] discovered that FDI helps host countries by reducing contamination levels. The findings of Zhang and Zhou (2016)[iv], which were based on a linear panel model, showed that FDI influxes and CO2 pollutants have an inverse relationship, supporting the pollution halo concept.

Emissions in Pakistan

Pakistan is one of the nations most impacted by the negative effects of air pollution and climate change. Pakistan was deemed the fifth most impacted country during the previous two decades as a result of climate change according to 2019 report by the research organization German Watch[v].

Being a developing nation, Pakistan must undergo an energy transition from highly polluting fossil fuels to clean forms of energy in order to support global efforts to reduce greenhouse gas (GHG) emissions as well as to protect public health and minimize air pollution. This is because, as a developing nation, Pakistan is obligated to have

increased energy consumption to ensure better living conditions for its citizens while also meeting the demands for energy growth.

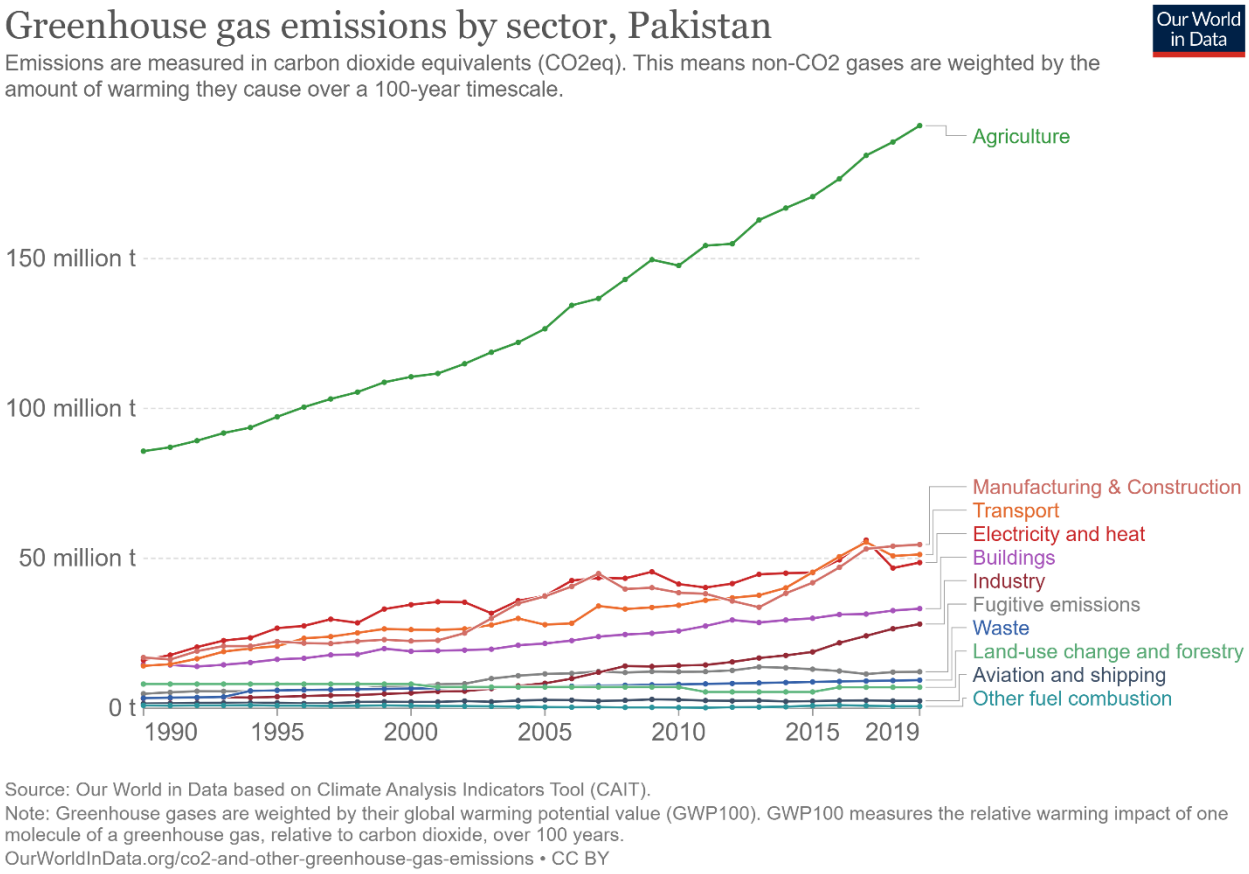

FIGURE 1 GREENHOUSE GAS EMISSIONS IN PAKISTAN[vi]

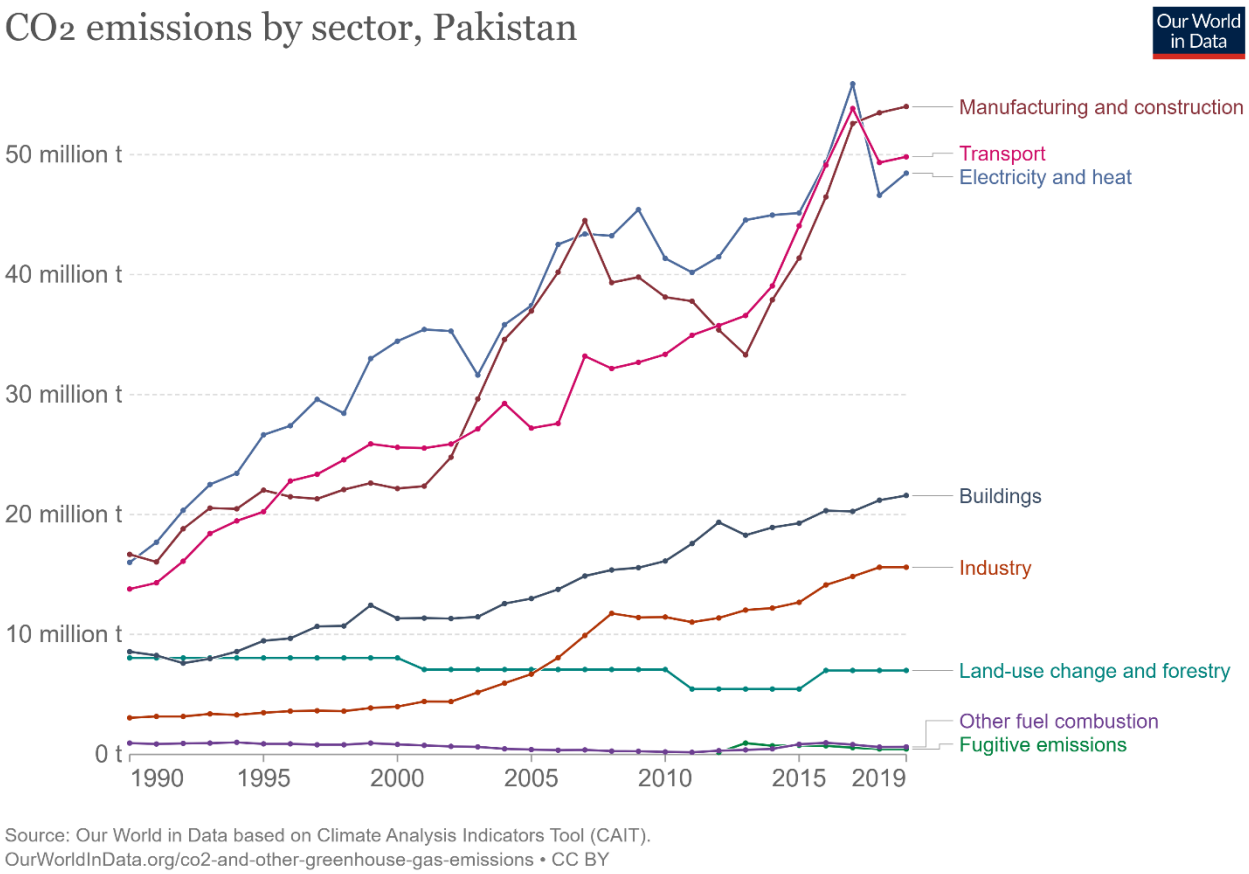

FIGURE 2 CO2 EMISSIONS BY SECTOR[vii]

The distribution of CO2 emissions among industries is seen in this graph. Similar to the worldwide breakdown of all greenhouse gases, the generation of energy and heat takes the lead, followed by transportation, manufacturing, and building.

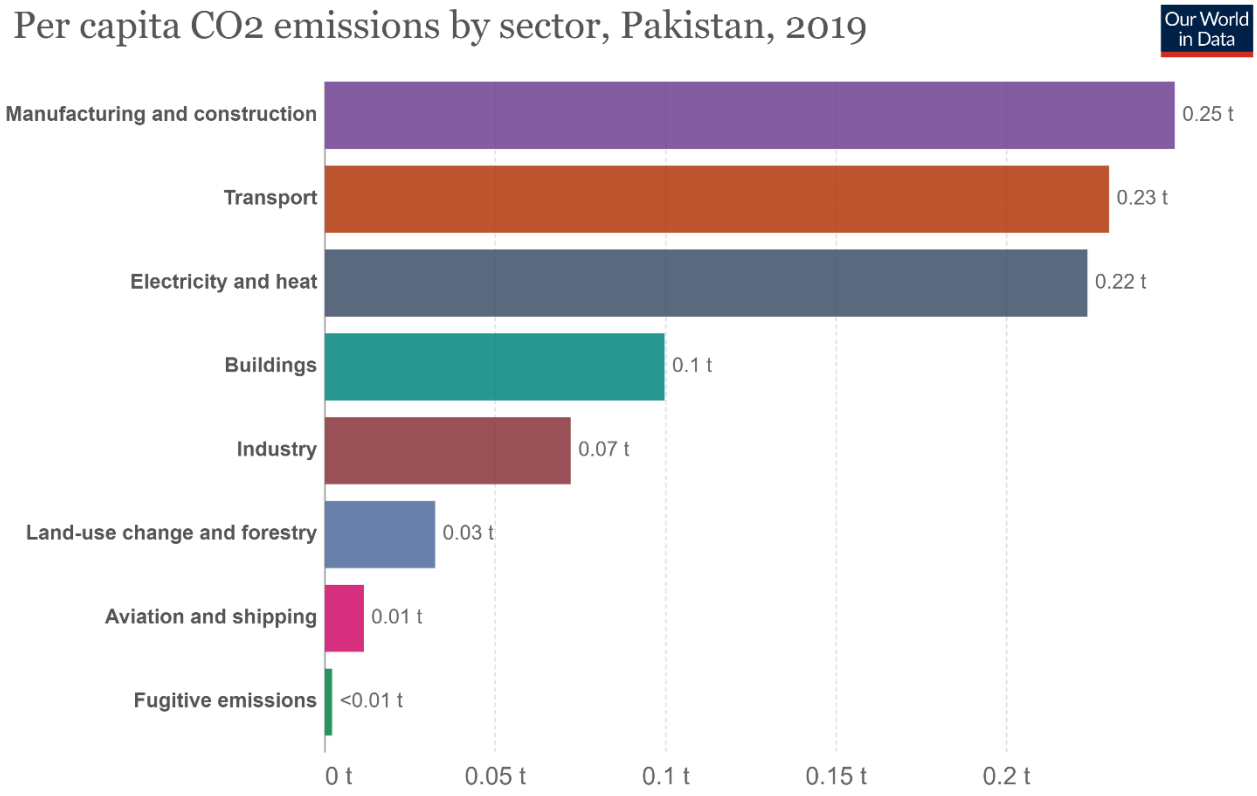

FIGURE 3 PER CAPITA CO2 EMISSIONS

Chapter 2: FDI in Pakistan[5]

Most of the countries have policies through which they encourage foreign countries to invest in their country through FDI as it brings international trade, foreign funds, share of technology , diversification, employment and economic boost[viii].

Pakistan's GDP grew slowly, from 0.4% in 2008-2009 to 4.24% in 2014-2015, while going to -1.3% in 2020[ix]. Most significantly, because of Covid-19, the nation's GDP growth rate didn't go well rather it drops down as alot of the countries in the world.

Negative projections have been made for 2020–2021. In spite of this, due to several strategic and economic advances that also involve building the China-Pakistan Economic Corridor (CPEC), Between 2014 and 2018, the economy of the nation showed encouraging trends across all significant economic sectors.

Despite the fact that international donors and rating agencies are placing their hopes in Pakistan's economic potential to become a rapidly expanding and promising regional economy, Pakistan is still having difficulty achieving its stated economic goals, which call for an annual growth rate of around 8%. Following persistent economic expansion locally, if not internationally, it is important to Pakistan should review its economic strategy because the nation has certain infrastructure, population, and human resource potential that might be extremely important in an unprecedented way in determining the socioeconomic makeup of the nation. For instance, despite a downturn in recent years, Over the past four decades, Pakistan's manufacturing

[5] Pakistan fiscal year from 1st July till 30th June

industry has grown at an annual average pace of about 7%.This demonstrates the tenacity of Pakistani businesses and industries, which is essential for long-term economic progress.[x]

Pakistan belongs to the group of developing countries given its tiny financial market and unstable foreign exchange and debt positions. In the early 90s the foreign exchange reserves remained less than $1.3B[6], which could only sufficient for 4-5 weeks of imports. Due to these circumstances, Pakistan needs to draw more foreign direct investment. FDI is a sizeable, long-term investment and a component of the host economy. FDI has a beneficial impact on the expansion of the economy of the host nation. The fact that FDI includes a package of finance, technology management, and market access is one compelling reason in favor of that. FDI typically targets manufacturing industries and important infrastructures that have a comparative advantage, both existing and potential. FDI would produce economies of scale and linking effects and increase productivity in those industries where it has a comparative advantage.

Repayment for FDI is only necessary if investors are profitable, and when they are profitable, they frequently reinvest their earnings rather than sending them elsewhere. A confidence-boosting effect is one more advantage of FDI. FDI inflows could boost confidence, fostering the development of a positive feedback loop that influences not

[6] In early June 1998, in response to Pakistan's nuclear test, the G-7 imposed economic sanctions, which caused the country's foreign exchange reserves to drop to $400–500 million. However, after the partial lifting of the G-7 sanctions and the restart of IMF support programs in January 1999, they returned to their prior level of $1.2-1.3 billion.

only domestic and foreign investment but also international commerce and production.

In order to gradually raise foreign direct investment (FDI) from USD 2.8 billion in Fiscal Year (FY) 2019–20 to USD 7.4 billion by Fiscal Year (FY) 2022–23, the government is working on a multiyear FDI strategy.

The United States has continuously been among the top five sources of foreign direct investment in Pakistan during the past 20 years. China was Pakistan's top foreign direct investment source in 2019, partly because of initiatives associated with the China-Pakistan Economic Corridor. U.S. businesses have committed to investing more than USD 1.5 billion directly in Pakistan over the previous 15 months. Also Japan started its automobile production in Pakistan in the early 1980s by investing in Suzuki, Toyota and Honda to start the production of automobiles locally.

Between 1997 and 2022, Pakistan saw an average annual growth of 158.21 USD million, with a record high of 1262.90 USD million in June 2008 and a record low of -390.90 USD million in October 2018 as shown in Table[xi].

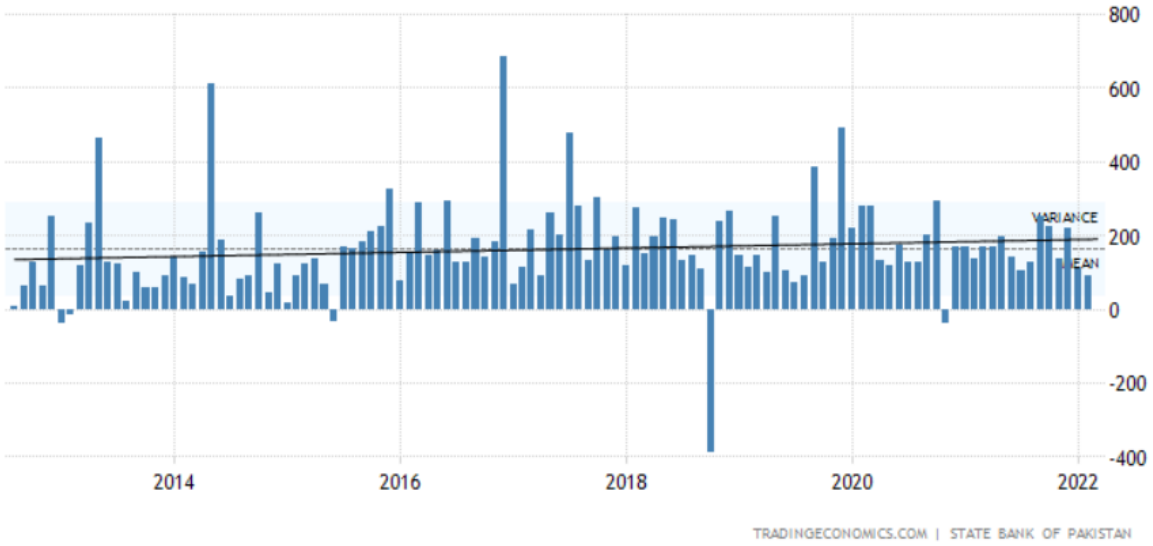

FIGURE 4 ANNUAL ECONOMIC GROWTH USD MILLIONS

In order to achieve its intended annualized return, effectively utilize its human and natural resources, strengthen its industrial and agricultural sectors, and, in general, establish itself a major regional economy, Several actions have already been taken by Pakistan. The 2015 inauguration of the historic China-Pakistan Economic Corridor (CPEC), a project of coordination and collaboration between the two countries, has become a symbol for rapid industrial growth and diffusion. Not only China but other countries have also invested in Pakistan due to its favorible economic policies.

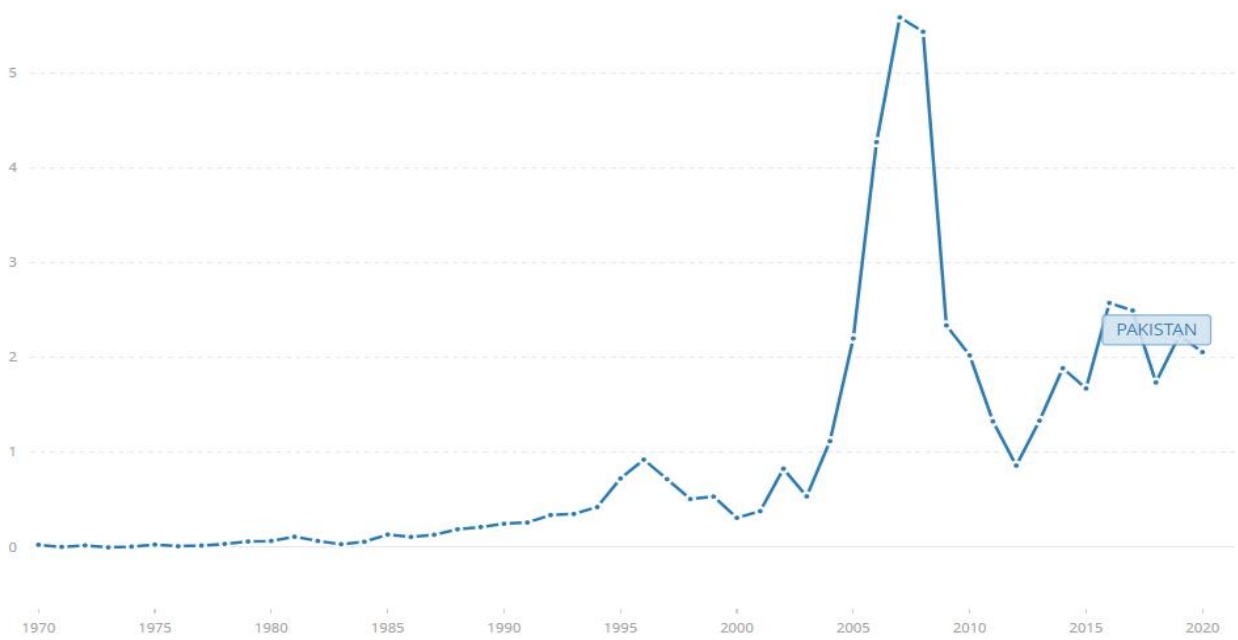

FIGURE 5 INFLOW OF FDI IN $BILLIONS[xii]

Country	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23 (July)
China	126.1	90.6	695.8	340.8	1,048.3	763.2	1,311.9	130.8	846.6	751.6	531.6	4.6
UK	205.8	633.0	157.0	169.6	151.7	215.4	304.6	185.0	119.1	141.0	31.8	0.3
USA	227.7	227.1	212.1	223.9	15.7	45.7	161.7	88.1	99.2	166.4	249.6	12.1
Hong Kong	80.3	242.6	228.5	136.2	187.0	123.0	183.6	171.0	190.7	157.2	137.7	0.4
Switzerland	129.9	149.0	209.8	(6.5)	59.5	101.7	78.5	21.2	62.8	61.7	146.2	11.5
U.A.E.	36.8	22.5	(47.1)	235.3	114.6	120.1	(4.4)	103.7	(44.0)	115.7	143.9	12.6
Italy	200.1	199.4	97.6	115.4	105.4	61.5	56.6	51.9	57.4	36.3	34.8	1.1
Netherlands	22.3	(118.7)	5.5	(34.5)	29.9	457.6	100.3	69.0	133.2	96.9	104.1	6.3
Austria	69.1	53.3	53.8	24.8	42.7	21.7	27.4	7.6	3.8	1.0	0.0	0.0
Japan	29.8	30.1	30.1	71.1	35.4	57.7	59.8	117.3	52.5	(13.0)	(12.3)	1.1
Turkey	3.3	0.5	7.9	43.4	16.9	135.6	29.8	73.8	26.1	13.4	(0.3)	0.0
Others	(310.5)	(73.0)	47.7	(285.7)	585.8	303.4	470.5	343.0	1,076.2	305.7	500.7	35.9
Total	**820.7**	**1,456.5**	**1,698.6**	**1,033.8**	**2,392.9**	**2,406.6**	**2,780.3**	**1,362.4**	**2,597.5**	**1,820.5**	**1,867.8**	**58.9**

FIGURE 6 COUNTRYWISE NET FDI IN $MILLIONS

Sector	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23 (July)
Oil & Gas	629.4	559.6	502.0	300.5	249.0	146.0	372.0	349.8	311.4	251.0	195.3	2.7
Financial Business	64.4	314.2	192.8	256.4	289.0	297.3	400.3	286.5	274.8	236.4	405.3	27.7
Textiles	29.8	13.9	(0.2)	43.9	20.0	15.5	49.7	76.8	37.7	2.6	3.6	(0.5)
Trade	25.3	5.1	(3.2)	50.6	26.6	32.6	143.0	76.3	43.2	115.9	79.9	3.4
Construction	72.1	47.7	28.8	53.5	36.9	8.3	40.4	70.2	20.9	31.1	36.5	2.9
Power	(84.9)	26.8	71.4	303.8	1,153.4	716.0	1,179.5	(323.9)	765.6	911.7	737.6	30.6
Chemicals	30.5	96.3	(47.1)	94.9	60.3	88.5	5.4	48.9	24.0	0.9	29.3	0.8
Transport	104.6	18.7	44.1	2.7	6.2	166.8	163.5	56.9	(1.5)	(93.6)	34.8	(0.7)
Communication (IT&Telecom)	(312.6)	(381.7)	434.2	62.2	241.4	(49.2)	113.5	(55.7)	664.0	117.1	118.9	10.6
Others	282.2	873.8	375.2	(103.4)	121.3	1,071.2	375.7	739.2	457.4	247.4	226.6	(18.6)
Total	**820.7**	**1,456.4**	**1,698.6**	**1,033.8**	**2,392.9**	**2,406.6**	**2,780.3**	**1,362.4**	**2,597.5**	**1,820.5**	**1,867.8**	**58.9**

FIGURE 7 SECTORWISE FDI IN $MILLIONS

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Year	Inflows (USD)	% Of GDP
2020	2.06 B	0.69
2019	2.23 B	0.7
2018	1.74 B	0.49
2017	2.50 B	0.74
2016	2.58 B	0.82
2015	1.67 B	0.62
2014	1.89 B	0.77
2013	1.33 B	0.58
2012	0.86 B	0.38
2011	1.33 B	0.62
2010	2.02 B	1.14
2009	2.34 B	1.39
2008	5.44 B	3.2
2007	5.59 B	3.67
2006	4.27 B	3.11
2005	2.20 B	1.83
2004	1.12 B	1.04
2003	0.53 B	0.58
2002	0.83 B	1.03
2001	0.38 B	0.48
2000	0.31 B	0.38

Chapter 3 : Special Economic Zone

SEZ are regions or areas within a country which are subjected to different economic regualtions than the other regions such as tax incentives and low tariffs, to facilate rapid economic growth. This economic growth is accomplished by leveraging tax incentives as a way of attracting foreign dollars and technological advancement.[xiii]

The 1960s and 1970s saw a substantial increase in the creation of free trade zones as a result of expanding global specialization, multinational businesses moving their manufacturing overseas, and host governments shifting their focus from imports to exports.

SEZ In Emerging Countries

In this regard, China is home to one of the SEZs' most astounding success tales. It took longer than India for the nation to implement the free zone policy, and it didn't accept the idea of SEZs until the late 1970s. In 1980, China built the first wave of SEZs. SEZs have since had tremendous success and have become a key factor in China's exports and economy.

As the example above show, China has, over the past forty years, become the second-largest economy in the planet. Importantly, overall objective of "reform and opening up", highlighting the significance of zones, specifically by observing the pratical results of Southeastern area, helped bring 800 million people or so out of extreme poverty since 1979[xiv].

The first SEZ was formed in late 1950s at Shannon Airpot in Cleare, Ireland.

The study shows that on average SEZs tend to attract 7 to 8 times more FDI than any other domestic industrial cluster.

As a result, SEZs have become more and more popular during the past twenty years. For instance, In 1986 there have been 176 SEZs spread over 47 nations, but the International Labor Office estimated that there were 35,00 SEZs in 130 countries in 2006. In addition, the World Bank estimated that there were approximately 43,00 SEZs[xv] worldwide in 2017 based on several research.

Over 1000 SEZs were established in the previous five years, according to the United Nations Conference on Trade and Development (UNCTAD), which estimates that there are approximately close to 5400 SEZs. At least 500 additional zones, or around 10% of the current amount, have been announced and are scheduled to launch in the next years.

Special Economic Zones in Pakistan

To encourage FDI in Pakistan , the first export processing zone[7] was established in 1989 in the metropolitan city Karachi, later EPZs were established in other parts of region however they were insufficient to meet the desired goals of investment and country's developement. The "Single Window" of the EPZ Authority (EPZA), which simplifies import and export authorizations as well as tax and duty payments, is accessible to investors through EPZs which includes waivers on materials, hardware, and equipment, as well as limitless loss carry-forward (including components, spare parts, and packaging

[7] Export processing zones are industrial zones where raw material can be imported and finished products are made to export in the world market

material). Pakistan experienced the need of SEZ but till then none of the SEZ has been established. In 2012 the Special Economic Zone Act was passed by the parliament and subsequent changes were made in 2016 to make it more business friendly explaining the fiscal and non-fiscal policies by the Govt. Of Pakistan and describing the roles and responsibilities of different governing bodies.

Fiscal Incentives:

For Developers ▪ Imported equipment for the creation, maintenance, and operation of the SEZ is once-only free from all customs charges and taxes. For a period of five years beginning on the day the Development Agreement was signed, all taxes on income accruable in connection with the creation and maintenance of the SEZ are exempt.

For Zone Enterprises ▪ The importation of equipment into the SEZ for installation is free once from all customs charges and taxes. Units that begin production by June 30, 2020 will be exempt from all income taxes for 10 years, while those that begin production after June 30, 2020 will be exempt for five years.

Non-Fiscal Incentives:

Mainly targets the infrastructure/compensation to the companies operating in the zones

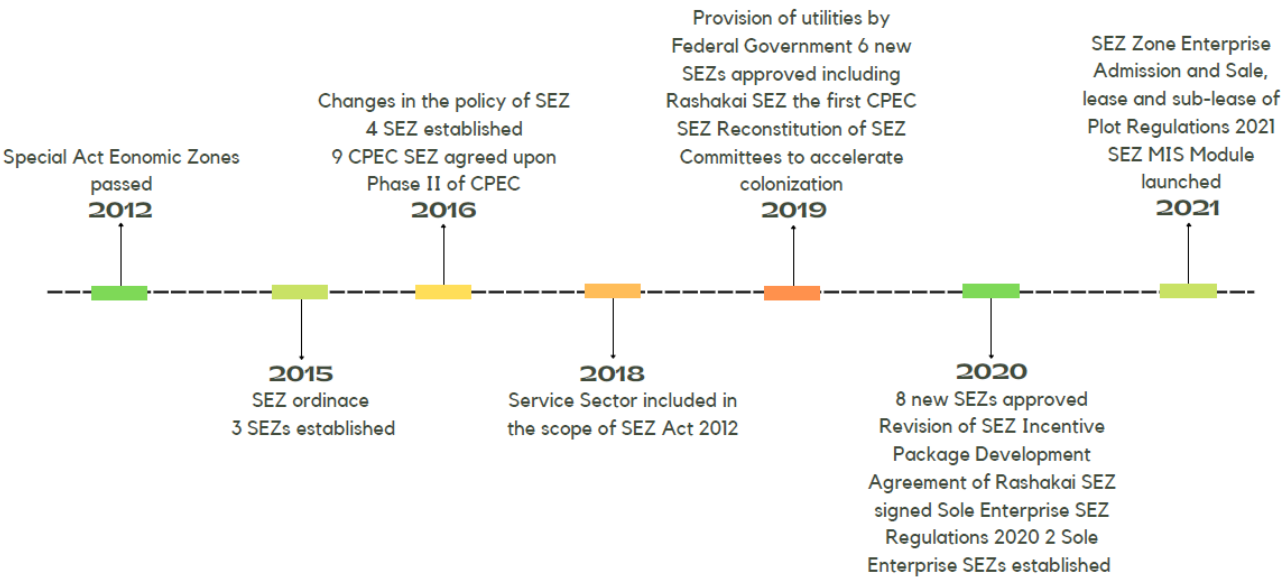

FIGURE 8 SEZ APPROVAL TIMELINE

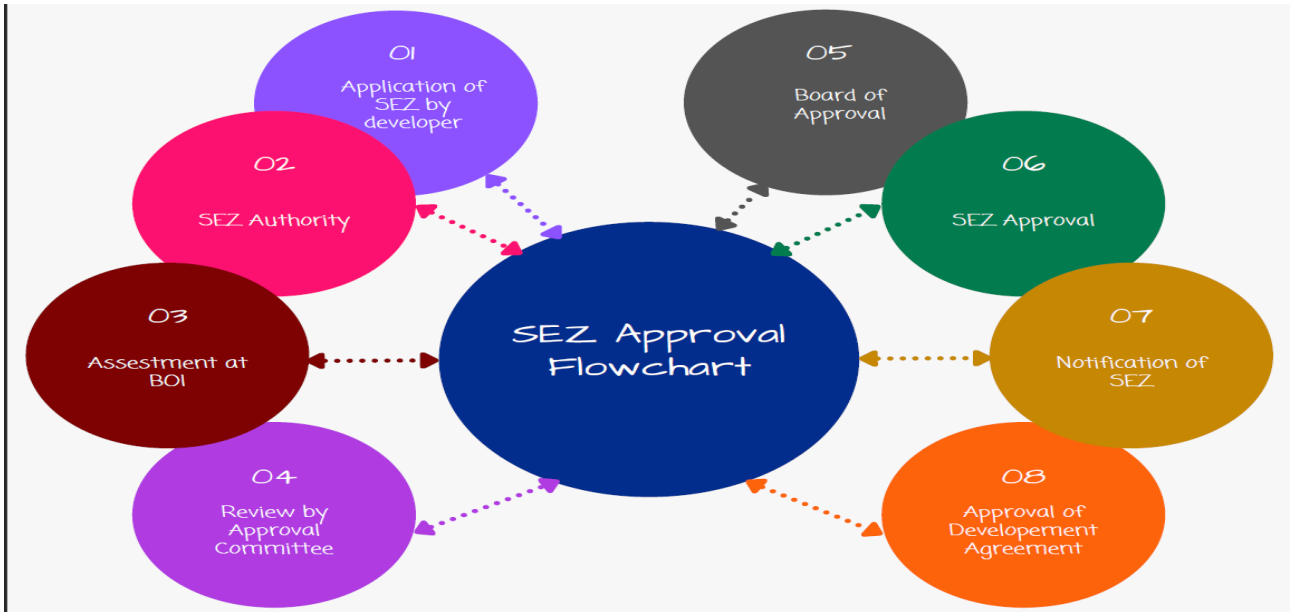

FIGURE 9 SEZ APPROVAL FLOWCHART

Historically, Pakistan had SEZs with enough infrastructure in practically every district. Offering different incentives for both domestic and foreign investment . For instance, Punjab, the province with the highest population, is home to almost twenty SEZs.

Balochistan, Khyber-Pakhtunkhwa (KP), and Sindh also established multiple SEZs. Among the aforementioned, some of these zones were successful in terms of the establishment of an industry and the production of capital and jobs. There are also unsuccessful cases too. For instance, Peshawar, the provincial capital of KP and a significant metropolitan hub from a commercial standpoint, is around 70 km away from the Rashakai Economic Zone. The Khairpur Economic Zone was constructed similarly, but around 30 kilometers outside of Khairpur city. Additionally, various industrial clusters are located in certain major Pakistani cities.

Due to their increased strength, (small industrial units that are not a part of a SEZ) in the availability of raw materials, a trained labor population, enabling institutions, and long-standing ties to regional and international supply networks. For example, these clusters include the Sialkot sports and surgical clusters, the Faisalabad textiles cluster, Gujarat's fan cluster and Gujranwala's engineering cluster are both located in Punjab at a great distance.

In Pakistan, parks (specialized industrial units that aren't officially part of a SEZ) which include Lahore's Marble City, Rachna Industrial Park, and Textile City (Port Qasim, Karachi). Lahore and Karachi are two major cities which have these industrial units but they are distant apart from eachother, Newly constructed industrial estates have M-3 Industrial City (Sheikhupura-Faisalabad Expressway), and Quaid-i-Azam Clothing Park (M-2 Lahore).

Pakistan has established 24 SEZs till now, all prospective investors in SEZs are given access to a variety of benefits, such as a ten-year tax break, a one-time exemption from import taxes on machinery and plant supplies, and simplified utility connections. Although Pakistan's SEZs provide significant financial, investor service, and infrastructure benefits to lower the cost of doing business, they have had trouble luring investment due to a lack of essential infrastructure. All of the specified SEZs are open to any enterprise, domestic or foreign, even though none of them are fully built. The characteristics of each Economic Zone are given below:

List of SEZs in Pakistan

1. Rashakai Special Economic Zone:
    - Processing and Manufacturing
    - Home Appliances
    - Pharmaceuticals
    - Home Building Materials
    - Automobiles and Parts
    - Agriculture and Horiculture
    - Wholesale Market/Speciality Mills
2. Dhabeji Special Economic Zone:
    - Light Engineering
    - Automotive and Auto parts
    - Chemical and Pharmaceuticals
    - Consumer Electronics Engineering
    - Textile and Garments
    - Steel Foundaries
    - Warehousing
    - Building Material

3. Allama Iqbal Industrial City:

    - Automobiles
    - Packaging
    - Building Material

4. Bostan Special Economic Zone:

    - Fruit Processing
    - Agriculture machinery
    - Pharmaceutical
    - Motor Bikes Assembly
    - Chromite
    - Ceramic industries
    - Ice and Cold storage
    - Electric Appliance
    - Halal Food Industry

5. Bin Qasim Industrial Park:

    - General Engineering
    - Automobiles & Allied
    - Foundry and Fabrication
    - Logistics & Storage
    - Mixed Used

6. HUB SEZ:

    - Garments
    - Food & Confectionary Industries
    - Chemical Industries
    - Ductile indsutries
    - Paper Manufacturing
    - Printing & Packaging
    - Ceramics
    - Marble Processing
    - Biotechnology, Concrete manufacturing
    - Mineral Grinding

7. Korangi Creek industrial:

    - General Engineering
    - Food Industries
    - Consumer Food & Pharmaceutical Products
    - Garments / Value added Textiles
    - Packaging & Printing & Warehousing/Logistics
    - Commercial and Business Centers,
    - Information Technology
    - Gems & Jewelry

8. Quaid-E-Azam Business Park:

    - Textile and Apparel related industries

9. Naushero Feroz Industrial Park:

    - Agro Food Processing
    - Agro Non Food Processing
    - Light Engineering
    - Mixed Used

10. Hattar Special Economic Zone:

    - Food and beverage
    - Agro-processing
    - Textile
    - Crockery
    - Paper printing
    - Chemical
    - Cement
    - Engineering

11. M3 Industrial City:

    - Engineering
    - Textiles
    - Electrical & Electronic
    - Chemical & Paints

- Food Processing
- Pharmaceuticals
- Automobiles
- Packaging and Building Material

12. Rachna Industrial Park:

- Auto Parts
- Leather Products
- Packaging and Food Processing units
- Mixed Used

13. Bhalwal SEZ:

- Citrus Processing Industry
- Frozen Concentrated Juice Industry
- Pharmaceuticals
- Seed & Crops Unit
- Packaging Industry
- Storage Industry
- Paper Industry
- Flour Mills
- Plastic Products
- Footwear
- Textile
- Warehouse

14. Vehari Industrial Estate:

- Handicrafts
- Chemical Industry
- Ginning Mills
- Agro Based Industry
- Shoe Industry
- Pesticides
- Pharmaceuticals
- Packaging Industry
- Storage Industry

- Paper Industry
- Flour Mills
- Plastic Products
- Textile
- Cold Storage
- Warehouse

15. Rahim yar khan SEZ:

- Oil Mills
- Chemical Industry
- Ginning Mills
- MDF Production
- Wood Plastic Composite Production
- Pesticides
- Polypropylene Woven Bags
- Pharmaceutical
- Packaging Industry
- Storage Industry
- Paper Industry
- Flour Mills
- Plastic Products
- Textile
- Cold Storage
- Warehouse

16. Value Addition City, Special Economic Zone:

- Textiles
- Engineering
- Electrical & Electronic
- Chemical & Paints
- Food Processing
- Pharmaceuticals
- Automobiles
- Packaging and Building Material

17. Oil Village SEZ:
    - Storage for Oil Marketing Companies
18. khairpur SEZ:
    - Agro Food Processing
    - non-food processing
    - Light Engineering & Manufaturing
19. National science and technology SEZ:
20. JW-SEZ China Pakistan SEZ
21. Service Long March Tyres SEZ:
    - Light Engineering and Manufacturing
22. Karachi Export Processing Zone:
    - Hi-Tech Industry
    - Gem & Jewelry
    - Software Houses
    - Information Technology Based Industries
    - Precession Engineering
23. Risalpur Export Processing Zone:
    - Industrial Design Companies
24. Sialkot Export Processing Zone:
    - Surgical
    - Sports
    - Leather Goods

Opportunities Offered

To build a strong basis for economic recovery and rebirth, Pakistan needs a robust industrial sector. SEZs will offer realistic options for expanding industrialization.

Pakistan is expected to have a preferred standpoint in the global and regional economies due to its superior manufacturing and export centers. While the CPEC[8] can be considered will improve infrastructure and finance in Pakistan and China's western region. Industrialization and economic activity would be beneficial for both the nation under the proposed SEZ.

The envisioned Special Economic Regions were indeed provide a solid economic incentive for Pakistani authorities to adopt changes to improve the national business atmosphere, legislating actions, economic output, export base, and marketing attractiveness for additional foreign investments. Additionally, a renewed sector will presumably create jobs for the enormous inhabitants.

Second, SEZs provide a chance to draw the Pakistan population with their talents, expertise, and their amassed wealth for the nation's more lucrative opportunities. The SEZs may help businesses group together and benefit from external economies, which will provide them the chance to advance local sectors up the learning curve.

Thirdly, prospects for increased trade are likely to encourage both governments to enhance their bilateral trade agreements. Additionally, within SEZs, Pakistani businesses will receive the most recent business and trade tactics from international organizations, competing with or complementing foreign businesses. Additionally, Special Economic Zones can give businesses a platform to take advantage of opportunities that are blatantly disregarded by the Pakistani government, given that most multinational

[8] CPEC: China Pakistan Economic Corridor

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corporations organize their production and trade along increasingly complicated global value and supply chains and are, as a result, searching for the least expensive locations.

Additionally, the SEZs offer provides the ability to manage labor pooling, reducing the cost of search lowering the skilled labor shortage. Additionally, when working in a SEZ, there may be a good chance of encouraging novel thoughts that can be shared between businesses and corporations.

Chapter 4: Methodology

ArcGIS Pro:

Esri created and maintains the ArcGIS family of geographic information system (GIS) services, client software, and server software. The more up-to-date version of ArcGIS Desktop is the 64-bit GIS program ArcGIS Pro. The ArcCatalog and ArcMap features are accessed through the same program, most frequently through the Catalog window, unlike ArcGIS Desktop.

The software can read multiple file format data including the graphical images such as (.jpg,.TIF etc), each graphical images contains information which is stored in the attribute table but to access attribute table first the images have to be converted into a raster layer[9].

For the most important part of the work to be analyzed, the first thing was to take the geographical map of Pakistan and mark the special economic zones which are assigned by the government. This was done on the software ArcGIS Pro by creating a shape file[10].

[9] One or more raster bands—also known as single band and multi band rasters—make up a raster layer. A value matrix is represented by one band. A raster made up of red, blue, and green bars is a color image (like an aerial shot).

[10] The position, shape, and characteristics of geographic features are stored in a shapefile, an Esri vector data storage format. It has one feature class and is saved as a group of linked files.

FIGURE 10 PAKISTAN SHAPE FILE

FIGURE 11 SEZ PLOTTED ON ARCGIS PRO

For CO2

The CO2 data have been available on NASA-Earth Science data[xvi] website for specific regions and different time frames. The important thing was to convert the data in a format which could be read by the software ArcGIS Pro, that was accomplished by making it a raster layer and then raster to point feature in the toolbox, In the output

feature class[11], a point will be produced for each cell of the input raster dataset. The centers of the points' corresponding cells will be where they are placed, was plotted on the same layer(i.e Pakistan Special Zones). The data has been divided into two time frames 2010 to 2014 and 2014 to 2017. The dataset from GEO-DISC is now corresponding to as a point and for each region it was divided into equal sized squares and at the centre of each square is the mean value of that particular region as can be seen in the image below.

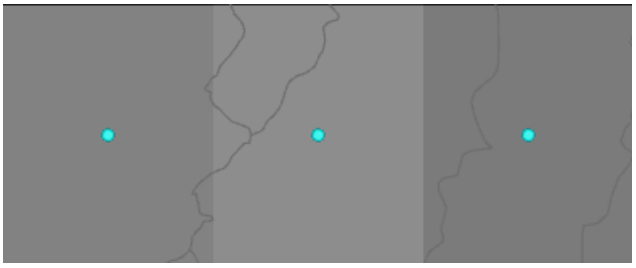


FIGURE 12 SQUARE IMAGE DISPLAYING MEAN POINT

[11] A group of features having the same geometry, such as a point, line, polygon, or annotation, is referred to as a feature class. A feature class can be stored as a stand-alone feature class in a geodatabase or alongside other feature classes in a feature dataset in a geodatabase.

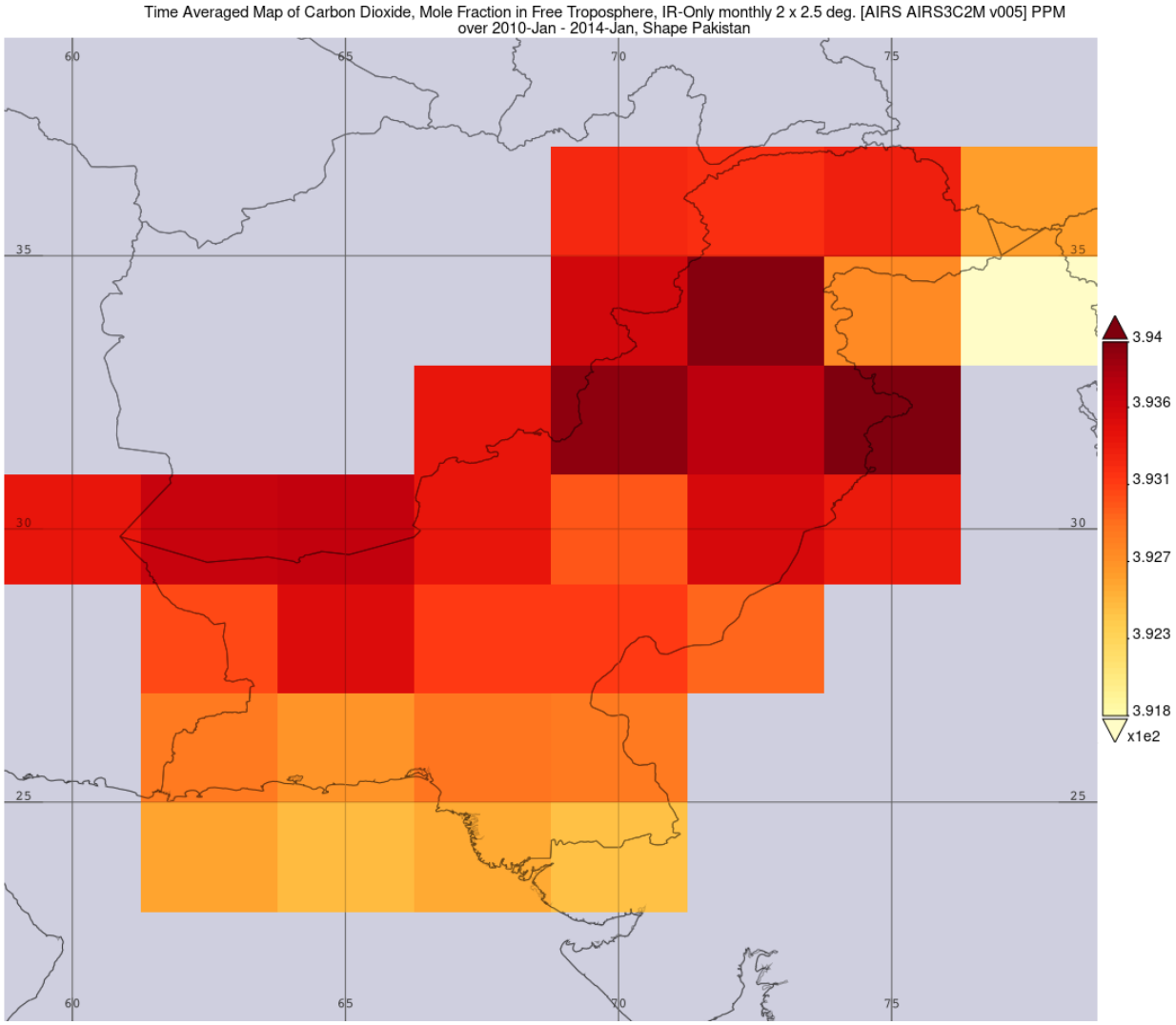


FIGURE 13 CO2 EMISSIONS FROM 2010-14

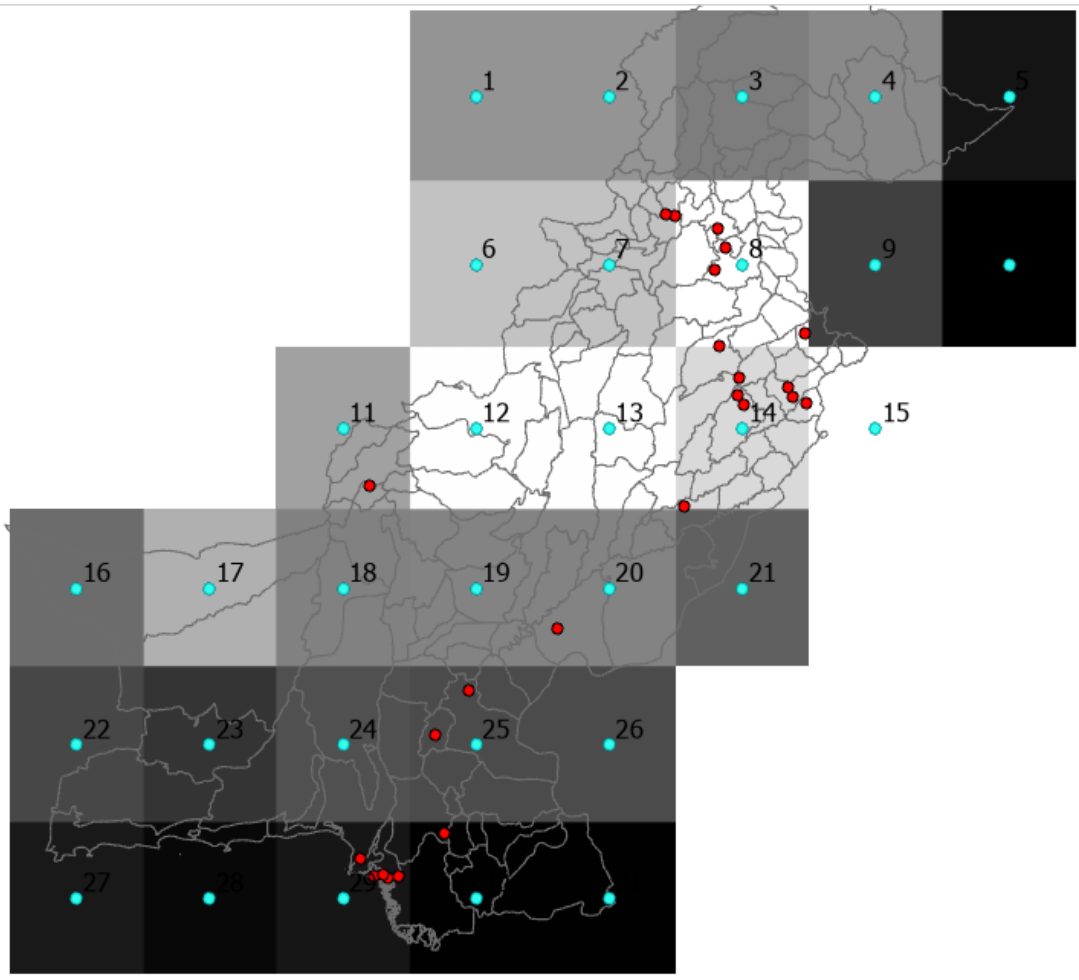


FIGURE 14 CO2 EMISSIONS FROM 2010-14 PLOTTED ON ARCGIS PRO

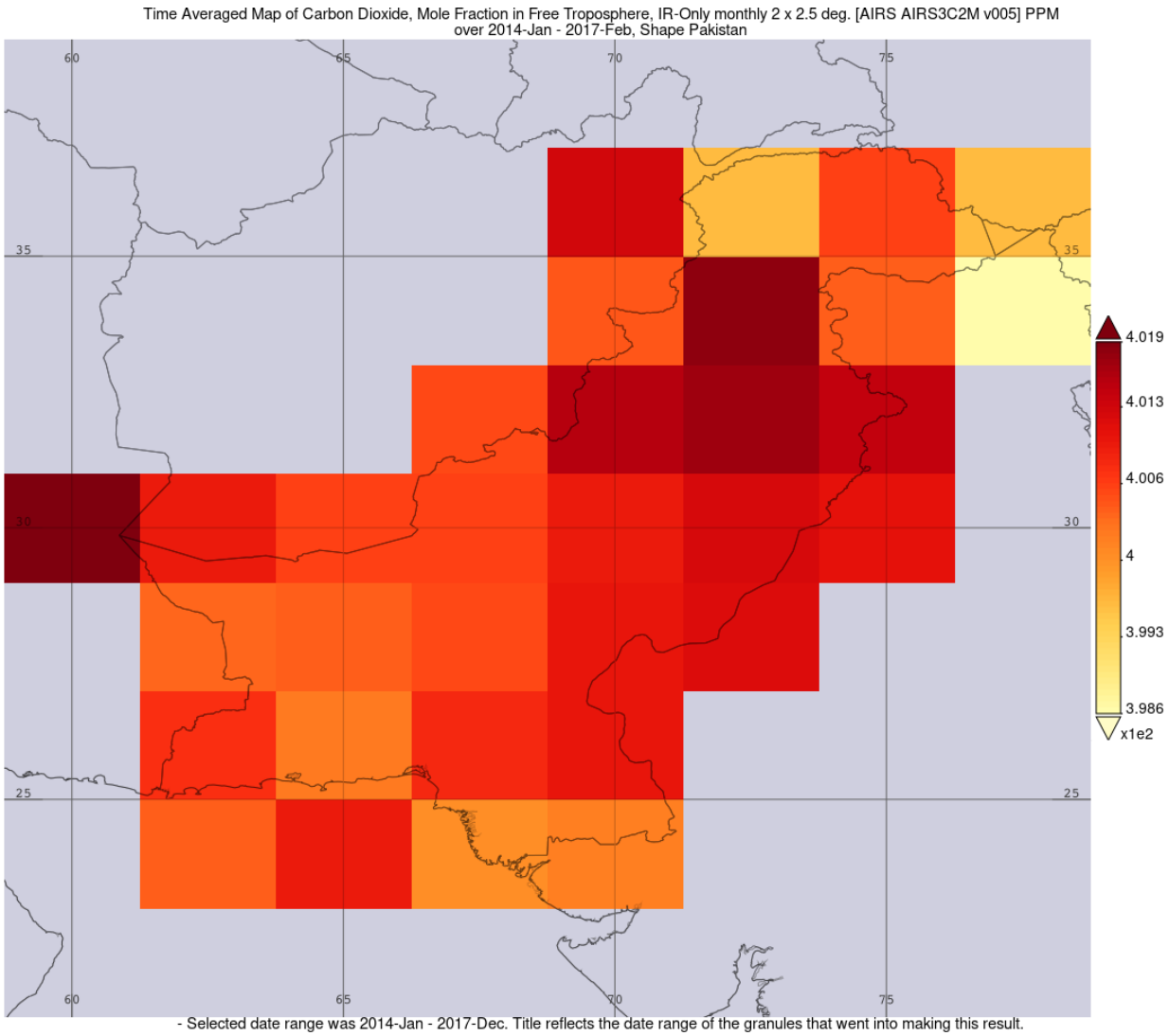


FIGURE 15 CO2 EMISSIONS FROM 2014-17

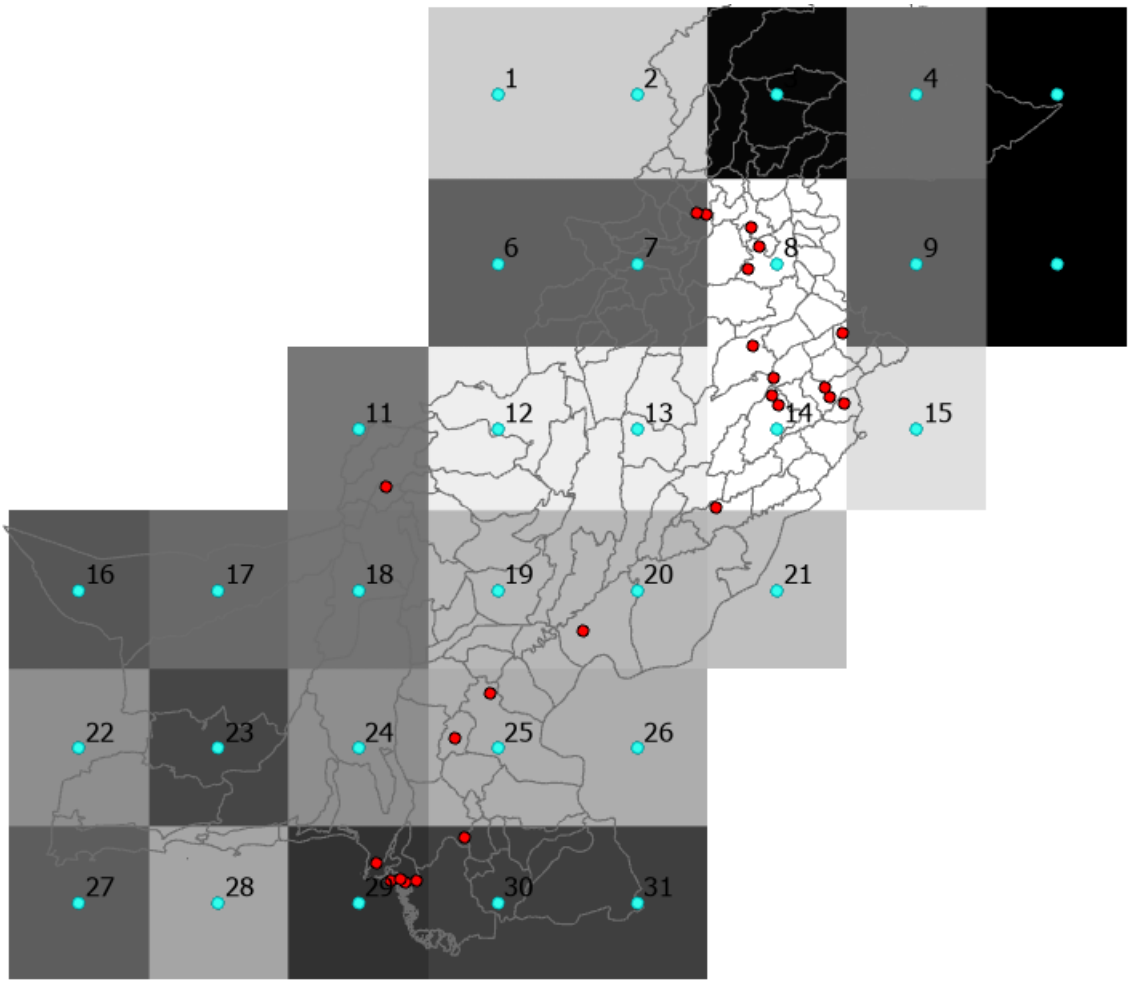


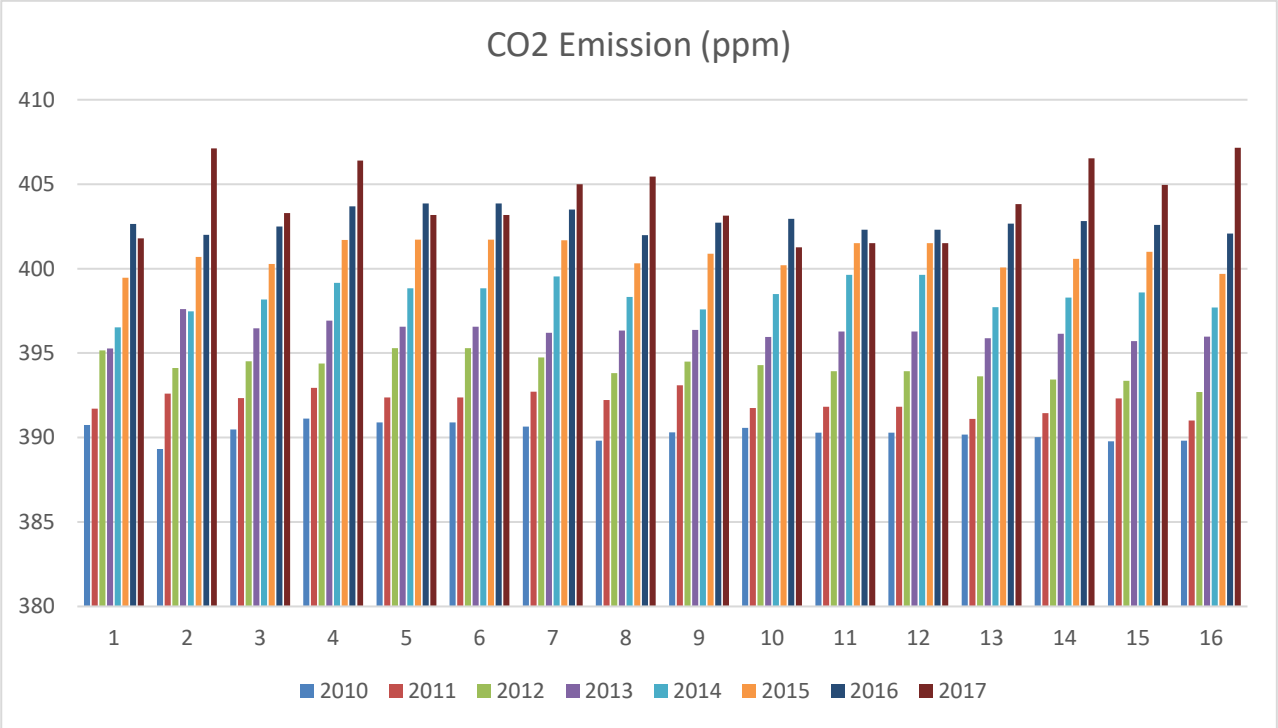
FIGURE 16 CO2 EMISSIONS FROM 2014-17 PLOTTED ON ARCGIS PRO

[12]

In total 31 observations have been taken into account whether they are in the SEZ or outside the SEZ. All this data would be helpful for the next step of our regression analysis.

[12] Red spots refer to the Special Economic Zones while the blue ones are points where CO2 data have been calculated.

During the time span from 2010-2017, the amount of CO2 emission have been calculated in the whole region of Pakistan and can be seen in the bar diagram below:



As we can observe there are certain regions where CO2 emissions have increased alot while in some it is increase only a tiny fraction. The lowest value of CO2 emission can be seen as 389.3229(ppm[13]) in year 2010 while the highest can be observed as 407.1651 (ppm) in the year 2017. According to a statistical analysis of global energy, Pakistan emits 189.2 Mt of CO2Es, or 0.6% of the world total, which is very low compared to

[13] Ppm= parts per millions, Carbon dioxide is released when humans use fossil fuels like coal and gasoline.

This figure indicates the amount of carbon dioxide in one million parts of air. Therefore, if carbon dioxide is 416 parts per million (ppm), there are 416 particles of carbon dioxide in every million air particles.

China's share of 27.6% but greater than Asian-Pacific nations. According to the Annual Greenhouse Index the CO2 has alone contributed 60% which has increased 45% from 1990-2019[xvii].

For CO

The same shape file of pakistan which was created before was taken into account and all the steps were the same, the only difference here would be the data set.

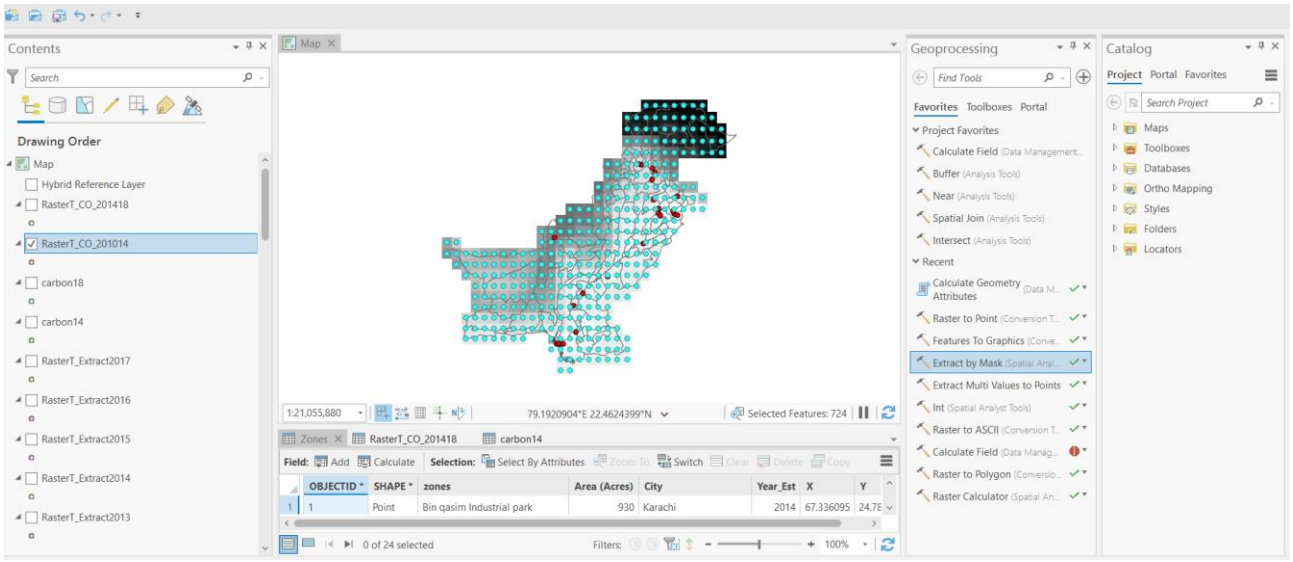


FIGURE 17 CO DATA PLOTTED ON ARCGIS PRO

In total the number of observations here were 331 and the observations are divided into group of squares and at the centre of each square is the mean value of that region.

Regression Analysis

Finding the variables that have an effect on an interest issue can be done with accuracy using regression analysis[xviii]. You can confidently establish which elements are most important, which ones can be ignored, and how these factors interact when you do a regression. The following concepts must be understood in order to completely comprehend regression analysis:

Dependent Variable: This is the fundamental element that you're attempting to comprehend or anticipate.

Independent Variable: You assume that each of them might have an effect on your dependent variable.

For data management, visualization, statistics, and automated reporting, Stata is a general-purpose statistical software program created by StataCorp. Researchers from a variety of disciplines, including biology, epidemiology, sociology, and science, use it.

In the thesis work Stata is used to run the regression analysis to find the link between Special Economic Zones and CO2 and CO.

The commands have been given below which have been executed.

- Import = import excel reads worksheets from Microsoft Excel (.xls and .xlsx) files.
- Summarize = summarize calculates and displays a variety of univariate summary statistics
- Generate= generate creates a new variable
- Append = combines two datasets

- Drop= drop eliminates variables or observations from the data in memory
- Replace= replace can be used to change just one value, as well as to make sweeping changes to our data
- Regress= to perform the regression analysis specifying the dependent and independent variables
- Hist= graphically represents a histogram of the variable name

For CO2

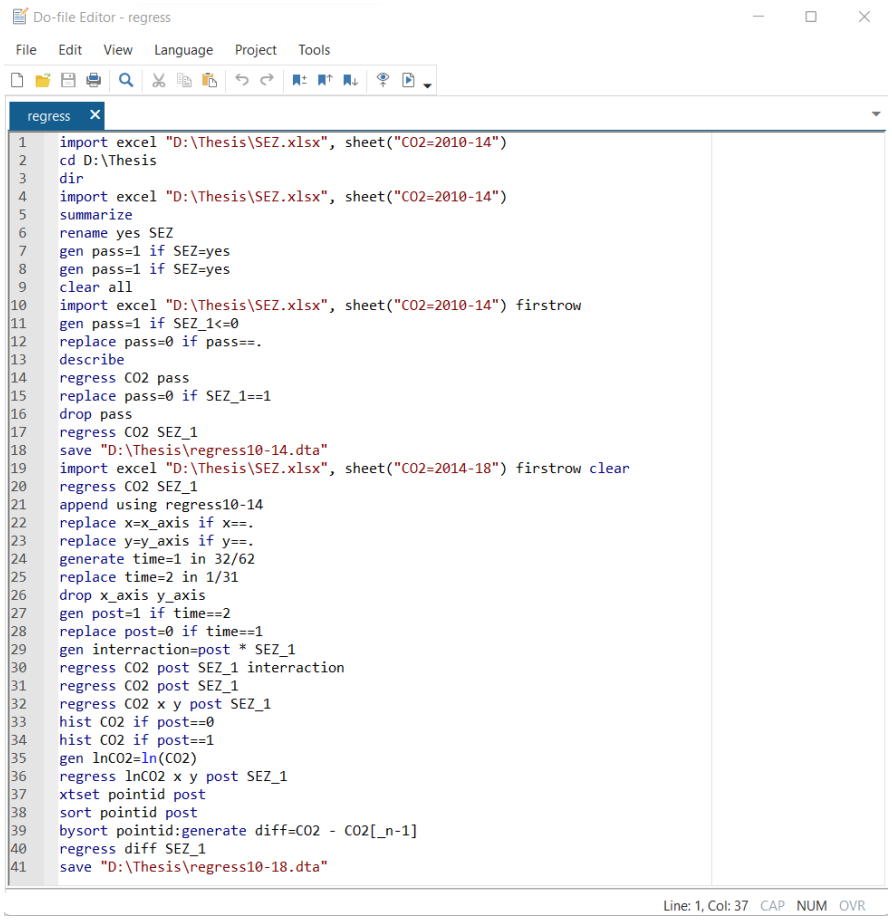


FIGURE 18 DO-FILE FOR STATA

The command regress **CO2[14] post SEZ_1[15]** would work in a way in which CO2 is our dependent variable while the others will be independent

The equation would be as below:

$$CO2[16] = ß_0[17] + ß1\ post + ß2SEZ\_1 + u$$

Where ß1 and ß2 are the two parameters (estimaters) which we will find by running the command while u is the standard error.

[14] Outcome variable

[15] Predictor variable

Results

```
. regress CO2 SEZ_1 post interraction

      Source |       SS           df       MS      Number of obs   =        62
-------------+----------------------------------   F(3, 58)        =    792.50
       Model |  887.664957         3  295.888319   Prob > F        =    0.0000
    Residual |  21.654853         58  .373359535   R-squared       =    0.9762
-------------+----------------------------------   Adj R-squared   =    0.9750
       Total |  909.31981         61  14.9068821   Root MSE        =    .61103

------------------------------------------------------------------------------
         CO2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       SEZ_1 |  -.0299499   .4467149    -0.07   0.947    -.924147    .8642472
        post |   7.503404   .1650286    45.47   0.000    7.173063    7.833744
interraction |   .4007571   .5372021     0.75   0.459   -.6745698    1.476084
       _cons |   393.1841   .1134657  3465.22   0.000     392.957    393.4112
------------------------------------------------------------------------------
```

FIGURE 19 REGRESSION ANALYSIS OF CO2

SS= sum of squares, which represent each observation subracted from the mean to the whole square, its an analogy to understand how spread out this data set is:

$$SS = \sum(x_i - \bar{x})^2$$

This shows the variation in our dependent variable.

The df model is represnting is the number of independent variable we used, out of our model SS 887.664957:

$$R^2 = 887.664957/909.31981 = 0.976$$

Which shows that 97.6% of the varition of R^2 in our dependent variable is due to the x variable, so the remaining 2.4% is going unexplained in our residual.

The total degree of freedom is given as:

$$df\ total = total\ number\ of\ observation - 1$$

The MS (mean square) is the sum of squares divided by the total degree of freedoms.

Adjusted R-squared depends on the degree of freedom as more and more variables are introduced to the system, R^2 will only increase;

$$Adjusted\ R-squared = 1-(1-\ R2)\frac{(n-1)}{(n-k-1)}$$

Where,

n= number of observations

k= number of variables

as k increases the adjusted R^2 will decrease, it represents the power in our model.

F-test statistics is conducted to understand whether we can reject the null hypothesis or not. The prob>F is 0.000% which means we can reject the null hypothesis at 95% confidence interval.

The null hypothesis:

$$H_o: ß1= ß2= ß3=0$$

Interpretation of CO2

Coefficients

$$CO2 = \_cons+ ß1(SEZ\_1)+ ß2(post)+ ß3(interraction)$$

For every additional SEZ, the expected amount of CO2 will decrease by -0.0299 on average , holding all other variables constant.

For CO2 data on the preceeding year 2014-17 (post) , the expected number of CO2 increases by 7.50 on average, holding all other variables constant.

For every SEZ established by the time in which CO2 data was extracted (interraction) , the amount of CO2 increases 0.4000 on average, holding all other variables constant.

For t-distribution and P-test[18]:

If the null hypothesis is true (ß1=0), the chances of us getting a sample extreme as we did (ß1=-0.0299) would be P>|t|= 94.7% for SEZ_1, which means that we cannot reject the null hypothesis hence coefficient of SEZ_1 is not related to the amount of CO2

Similarly, If the null hypothesis is true (ß2=0), the chances of us getting a sample extreme as we did (ß2=7.50) would be P>|t|= 0.0% for post, which shows that we can reject the null hypothesis. Also, this shows us that comparing the two set of years before and after the formation of Special Economic Zone, the amount of CO2 has increased hence ß2 ≠ 0.

If the null hypothesis is true (ß3=0), the chances of us getting a sample extreme as we did (ß3=-0.4000) would be P>|t|= 45.9% for interraction. However the probability is not higher nor alot lower so we can say that we can reject the null hypothesis and the coefficient of interraction do effect the amount of CO2.

95% Confidence Interval

The last two columns are looking at the coefficients of each independent variable and it creates a 95% CI around the coefficient that the value is somewhere in between:

- For SEZ_1 the value of coefficient is somewhere in between -0.924147 to 0.8642472 and since our P-test shows that this coeffiecient doesnot have impact on CO2 which means the value can be zero which we can see from this table that zero is included in the range.

[18] P-test in regression analysis is two tailed test

- For Post the value of coefficient is somewhere in between 7.173 to 7.833 and as our P-test has already shown that this coefficient cannot be zero which we can see that zero is not included in this range.
- For Interraction the value of coefficient is somewhere in between -0.674 to 1.476 and as our P-test has already shown that this value can be zero or non zero as the probability is 45.9%

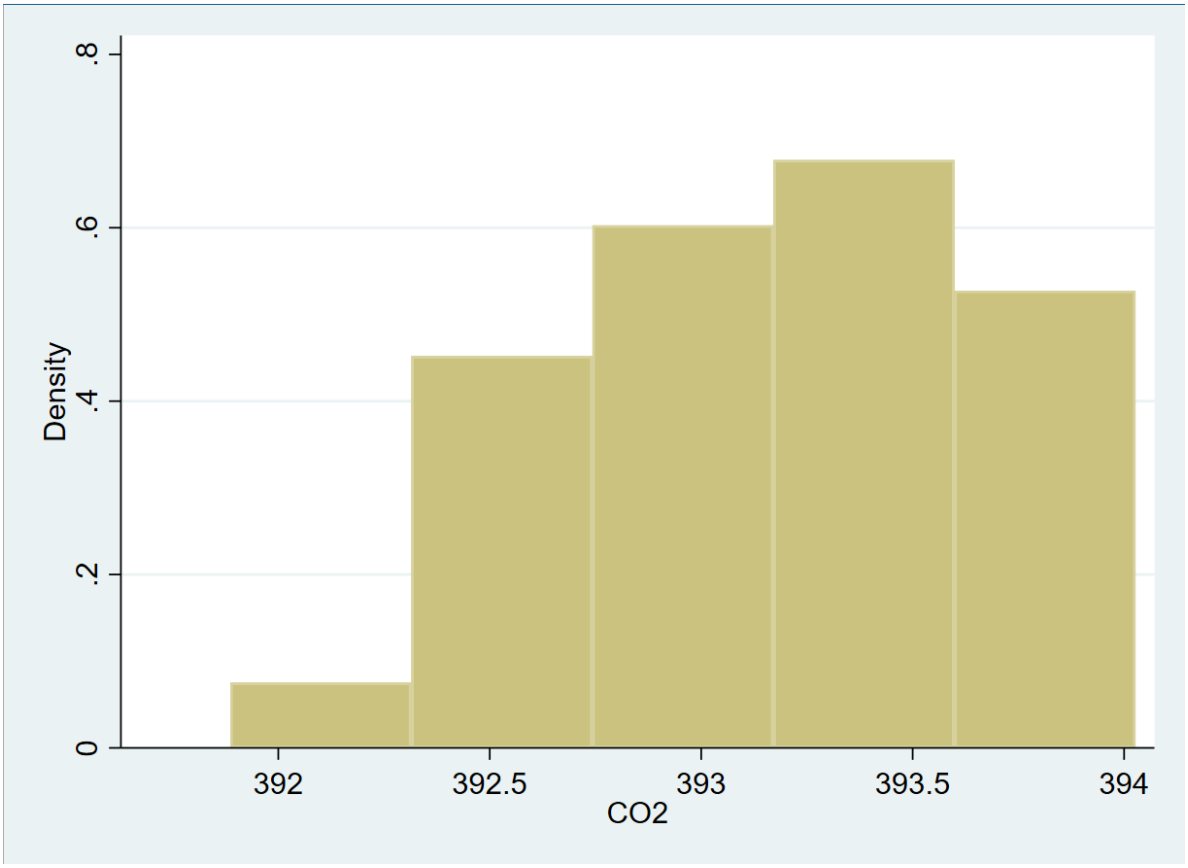


FIGURE 20 HISTOGRAM CO2

As our histogram is skewed to the right, we generate log of our dependent variable to make it more normal and the results are as follows:


```
. regress lnCO2 x y post SEZ_1
```

Source	SS	df	MS	Number of obs	=	62
				F(4, 57)	=	624.96
Model	.005641298	4	.001410325	Prob > F	=	0.0000
Residual	.000128629	57	2.2567e-06	R-squared	=	0.9777
				Adj R-squared	=	0.9761
Total	.005769928	61	.000094589	Root MSE	=	.0015

lnCO2	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x	-.0000816	.000056	-1.46	0.151	-.0001938	.0000307
y	.0001342	.0000654	2.05	0.045	3.31e-06	.0002652
post	.0189874	.0003861	49.17	0.000	.0182142	.0197607
SEZ_1	.0007234	.0006124	1.18	0.242	-.0005029	.0019498
_cons	5.975878	.0030837	1937.91	0.000	5.969703	5.982053

FIGURE 21 REGRESSION ANALYSIS OF LNCO2

$$lnCO2 = \beta o + \beta 1(x) + \beta 2(y) + \beta 3(post) + \beta 4(SEZ_1)$$

Interpretation of $lnCO_2$

By taking log of CO2, we can see that our R^2 value increased a bit which comprehends that 97.7% variation in our dependent variable is due to the independent variables

Coefficients

By increase in X, if we are are moving on x-axis, keeping all other variables constant , the amount of lnCO2 will decrease -0.0000816 by average.

By increase in Y, y-axis, keeping all other variables constant , the amount of lnCO2 will increase 0.0001342 on average keeping all other variables constant.

By increase in post (the data from 2014-17), the amount of lnCO2 will increase 0.01898 by average, keeping all other variables constant.

By increase in SEZ_1 (if there is a special economic zone), the amount of lnCO2 will be increased 0.0007234 by average , keeping all other variables constant.

Standard Error:

The standard error is used to calculate the t-value:

$$t = \frac{Coefficient}{Standard\ Error}$$

For t-distribution and P-test:

Again as before the results from P-test tested on t-distribution will be discussed below, first we have to check the null hypothesis.

The null hypothesis:

$$H_o: ß1 = ß2 = ß3 = 0$$

If the null hypothesis is true (ß1=0), the chances of us getting a sample extreme as we did (ß1=-0.0000816) would be P>|t|= 15.1% for x, which means that we cannot reject the null hypothesis but the coeffiecient of x doesn't have great significance on lnCO2.

Similarly, If the null hypothesis is true (ß2=0), the chances of us getting a sample extreme as we did (ß2=0.0001342) would be P>|t|= 4.5% for y, which means we can reject the null hypothesis and the y-axis do have impact on amount of lnCO2.

If the null hypothesis is true (ß3=0), the chances of us getting a sample extreme as we did (ß3=0.0189874) would be P>|t|= 0.0% for post, we can reject the null hypothesis and this do have impact on our level of lnCO2.

If the null hypothesis is true (ß4=0), the chances of us getting a sample extreme as we did (ß4=0.0007234) would be P>|t|= 24.2% for SEZ_1, which means we cannot reject the null hypothesis.

95% Confidence Interval

Similarly here again the last two columns are explaning the range of our coefficient value that it can be somewhere in between:

- For x-axis, the value of coefficient would be somewhere in between -0.0001938 to 0.0000307 and as our P-test has already concluded that this value sometimes can have impact on lnCO2 and the probability is 15.1% which means the value of coefficient sometimes can be zero or a non-zero.
- For y-axis, the value of coefficient would be somewhere in between 0.00000331 to 0.0002652 and as our P-test has already concluded that this value can't be zero and we can see from these results that zero is not included in this range.
- For Post, the value of coefficient would be somewhere in between 0.0182 to 0.0197 and as our P-test has already concluded that this value won't be zero and we can see from this range also that zero is not a part of this range.
- For SEZ_1, the value of coefficient would be somewhere in between -0.0005029 to 0.001949 and as the P-test has already shown that this value can be zero which we can see that zero is included in this range.

For CO

The commands which were executed are almost the same as before only the data and observations are different. The observations consist of 331 points, so by combining both two time frames (2010-14) and (2014-17) , our total observations would be 662.

Do-file Editor - CO

File Edit View Language Project Tools

CO

```
1  import excel "D:\Thesis\SEZ.xlsx", sheet("CO 2010-14") firstrow
2  summarize SEZ
3  gen pass=1 if SEZ_1<=0
4  replace pass=0 if pass==.
5  describe
6  regress CO pass
7  replace pass=0 if SEZ_1==1
8  drop pass
9  regress CO SEZ_1
10 save "D:\Thesis\regress CO 10-14.dta"
11 import excel "D:\Thesis\SEZ.xlsx", sheet("CO 2014-18") firstrow clear
12 regress CO SEZ_1
13 append using "D:\Thesis\regress CO 10-14.dta"
14 generate time=1 in 332/662
15 replace time=2 in 1/331
16 gen post=1 if time==2
17 replace post=0 if time==1
18 gen interraction=post * SEZ_1
19 regress CO post SEZ_1 interraction
20 gen lnCO=ln(CO)
21 regress lnCO x y post SEZ_1
22 regress diff SEZ_1
```

FIGURE 22 DO-FILE FOR STATA

Results

```
. regress CO post SEZ_1 interraction
```

Source	SS	df	MS	Number of obs	=	662
				F(3, 658)	=	84.29
Model	1.6012e-06	3	5.3373e-07	Prob > F	=	0.0000
Residual	4.1663e-06	658	6.3317e-09	R-squared	=	0.2776
				Adj R-squared	=	0.2743
Total	5.7674e-06	661	8.7253e-09	Root MSE	=	8.0e-05

CO	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
post	-.0000958	6.29e-06	-15.24	0.000	-.0001081	-.0000834
SEZ_1	.0000465	.0000269	1.73	0.084	-6.31e-06	.0000993
interraction	.0000697	.0000356	1.95	0.051	-3.28e-07	.0001397
_cons	.0005526	4.43e-06	124.62	0.000	.0005439	.0005613

FIGURE 23 REGRESSION ANALYSIS OF CO

Interpretation of CO

SS= sum of squares, which reprents each observation subracted from the mean to the whole square, its an analogy to understand how spread out this data set is:

$$SS = \sum(x_i - \bar{x})$$

This shows the variation in our dependent variable.

The total degree of freedom is given as:

$$df\ total = total\ number\ of\ observation - 1$$

The number of independent variables are 3 which makes our total degree of freedom (total observations “662”-1) equal to 661

$$CO = \beta_0 + \beta 1(post) + \beta 2(SEZ_1) + \beta 3(interraction)$$

In the above regression, CO was taken as the dependent variable while the rest are independent variables. When the command run as we can see the _cons is the ß1 estimator which values as 0.0005526 and the rest are ß2, ß3 and ß4 estimators. By default our null hypothesis is equal to zero.

The column t is calculated on the formula which is as follows:

$$t = \frac{coefficient}{standard\ error}$$

Coefficient:

By post time of CO, if we are are looking on the amount of CO during the year 2014-17, keeping all other variables constant , the amount of CO will decrease -0.0000958 by average.

By increase in SEZ_1, the number of increase in SEZ, keeping all other variables constant , the amount of CO will increase 0.0000465 on average keeping all other variables constant.

By increase in interraction, meaning there is SEZ when the data was collected, the amount of CO will increase 0.0000697 by average, keeping all other variables constant.

For t-distribution and P-test

The null hypothesis:

H_o: ß1= ß2= ß3=0

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If the null hypothesis is true (ß1=0), the chances of us getting a sample extreme as we did (ß1=-0.0000958) would be P>|t|= 0.00% for post, which means that we can reject the null hypothesis and the coeffiecient of post have significance on CO.

Similarly, If the null hypothesis is true (ß2=0), the chances of us getting a sample extreme as we did (ß2=0.0000465) would be P>|t|= 8.4% for SEZ_1, which means we can reject the null hypothesis and the SEZ_1 do have impact on amount of CO.

If the null hypothesis is true (ß3=0), the chances of us getting a sample extreme as we did (ß3=0 .0000697) would be P>|t|= 5.1% for interraction, we can reject the null hypothesis and this do have impact on our level of CO.

95% Confidence Interval

In the last two columns the 95% CI is displaying the range in which our coefficient value could be in between:

- For Post, the vaue of coefficient could be somewhere in between -0.0001081 to -0.0000834 and as our P-test has shown the results that this coefficient can't be zero and we can see that zero is not included in this range.
- For SEZ_1, the value of coefficient could be somewhere in between -0.00000631 to 0.0000993 and as our P-test has shown the results that the coefficient can be zero so thatswhy zero is in this range.
- For Interraction, the value of coefficient could be somewhere in between -0.000000328 to 0.000139 and as our P-test has shown the results that the coefficient can be zero and it is inlcuded in the range.

```
. regress lnCO x y post SEZ_1
```

Source	SS	df	MS	Number of obs	=	662
				F(4, 657)	=	243.86
Model	18.8623592	4	4.71558979	Prob > F	=	0.0000
Residual	12.704369	657	.019336939	R-squared	=	0.5975
				Adj R-squared	=	0.5951
Total	31.5667281	661	.047756018	Root MSE	=	.13906

lnCO	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x	.0090869	.0018171	5.00	0.000	.0055188	.0126549
y	-.069001	.0030007	-23.00	0.000	-.0748931	-.0631089
post	.1511362	.0192474	7.85	0.000	.1133425	.18893
SEZ_1	.1373475	.0309981	4.43	0.000	.0764802	.1982148
_cons	-6.258587	.1145216	-54.65	0.000	-6.48346	-6.033715

FIGURE 24 REGRESSION ANALYSIS OF LNCO

$$lnCO = \beta o + \beta 1(x) + \beta 2(y) + \beta 3(post) + \beta 4(SEZ_1)$$

Interpretation of lnCO

The total number of observations are the same as before which are equal to 662 including both the time spans which our data is divided into. The number of independent variables are 4 . The df model is represnting is the number of independent variable we used, out of our model SS 18.86235:

$$R^2 = 18.86235/31.5667281 = 0.5951$$

Which shows that 59.5% of the varition of R^2 in our dependent variable is due to the x variable.

Coefficient

By moving on x-axis, keeping all other variables constant , the amount of lnCO will increase by 0.0090869 by average.

By moving on y-axis, keeping all other variables constant , the amount of lnCO will decrease by -0.069001 on average keeping all other variables constant.

By increase in post, the amount of lnCO will increase 0.1511362 by average, keeping all other variables constant.

By increase in SEZ_1, the amount of lnCO will increase 0.1373475 by average, keeping all other variables constant.

For t-distribution and P-test:

The null hypothesis:

$$H_o: ß1= ß2= ß3= ß4=0$$

If the null hypothesis is true (ß1=0), the chances of us getting a sample as extreme as we did (ß1=0.0090869) would be P>|t|=0% for x-axis, which means we can reject the null hypothesis and moving on x-axis do have an impact on our level of CO.

Similarly if If the null hypothesis is true (ß2=0), the chances of us getting a sample as extreme as we did (ß2=-0.069001) would be P>|t|=0% for y-axis, which means we can reject the null hypothesis and moving on y-axis do have an impact on our level of CO.

If the null hypothesis is true (ß3=0), the chances of us getting a sample as extreme as we did (ß3=0. 1511362) would be P>|t|=0% for post, which means we can reject the null hypothesis and with the passage of time the amount of CO is affected.

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If the null hypothesis is true (ß4=0), the chances of us getting a sample as extreme as we did (ß4=0.1373475) would be P>|t|=0% for SEZ_1, which means we can reject the null hypothesis and with the presence of SEZ the amount of CO is affected.

95% Confidence Interval

In the last two columns the 95% CI is displaying the range in which our coefficient value could be in between:

- For x, the value of coefficient could be somewhere in between 0.0055188 to 0.0126549 and as our P-test results shows that the coefficient can't be zero hence zero is not in this range.
- For y, the value of coefficient could be somewhere in between -0.074893 to -0.0631089 and as our P-test results shows that the coefficient can't be zero hence zero is not in this range.
- For post, the value of coefficient could be somewhere in between 0.1133425 to 0.18893 and as our P-test results shows that the coefficient can't be zero hence zero is not in this range.
- For SEZ_1, the value of coefficient could be somewhere in between 0.0764802 to 0.1982148 and as our p-test results shows that the coefficient can't be zero hence zero is not in this range.

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Conclusion

Foreign direct investment,most of the times have significant impact on the country's economy and many countries make their policies friendly to attract foreign direct investment. In our case Pakistan has established multiple Special Economic Zones to engage foreign companies to invest in pakistan and as our study has shown that thousands of companies have invested in Pakistan which is benefical for both the parties. Our case in which we have to do the analysis that how much environment is affected due to these investments, the results are deduced in which we can see that overall the amount of CO2 is increased in the region but the industries doesn't have much impact due to this increase amount. As the final results of regression analysis clearly shows that some variables do have a significant impact on the amount of CO2 while others don't and in the case of increasing number of Special Economic Zones, the results can be seen as they don't significantly impact on the amount of increased CO2, however the results also shows that if data is collected of a particular region where there was no SEZ and after few years when SEZ is established in that region and then the data results shows that the amount of CO2 is increased in that part however not alot as one can think of. If we go a bit back in the report to the regression part and look at Figure 17 , the P-test clearly shows that the coefficient of post (data collected before SEZ and after) resulted in increased CO2. Similarly in the same figure we can also see that SEZ_1 if it is already established in both time frames when the data is collected , the amount of CO2 is not dependent on the SEZ and the P-test also shows that we cannot reject null hypothesis (ß=0).

Similarly, when the same analysis is conducted on the amount of Carbon Monoxide , the results shows us clearly that the amount of CO is not increasing significantly due to the increasing number of SEZ, also the results can be seen in Figure 21 , in which our interest of variables were post, SEZ and interraction; and the final results on 95% CI shows us that these variables do have impact on the level of CO but not alot.

So, we can conclude that FDI doesnot have much negative potential consequences as presented by **Pollution-halo hypothesis**[xix], FDI can contribute to environment sustainability by using environment friendly technologies which takes place due to the transfer of green-efficient technologies specially in the developing countries and as in our case if we conduct research in future again and compare our results we can see that FDI would some how helps to reduce the environmental emission. An interesting perspective that globalization may not be entirely bad for the environment

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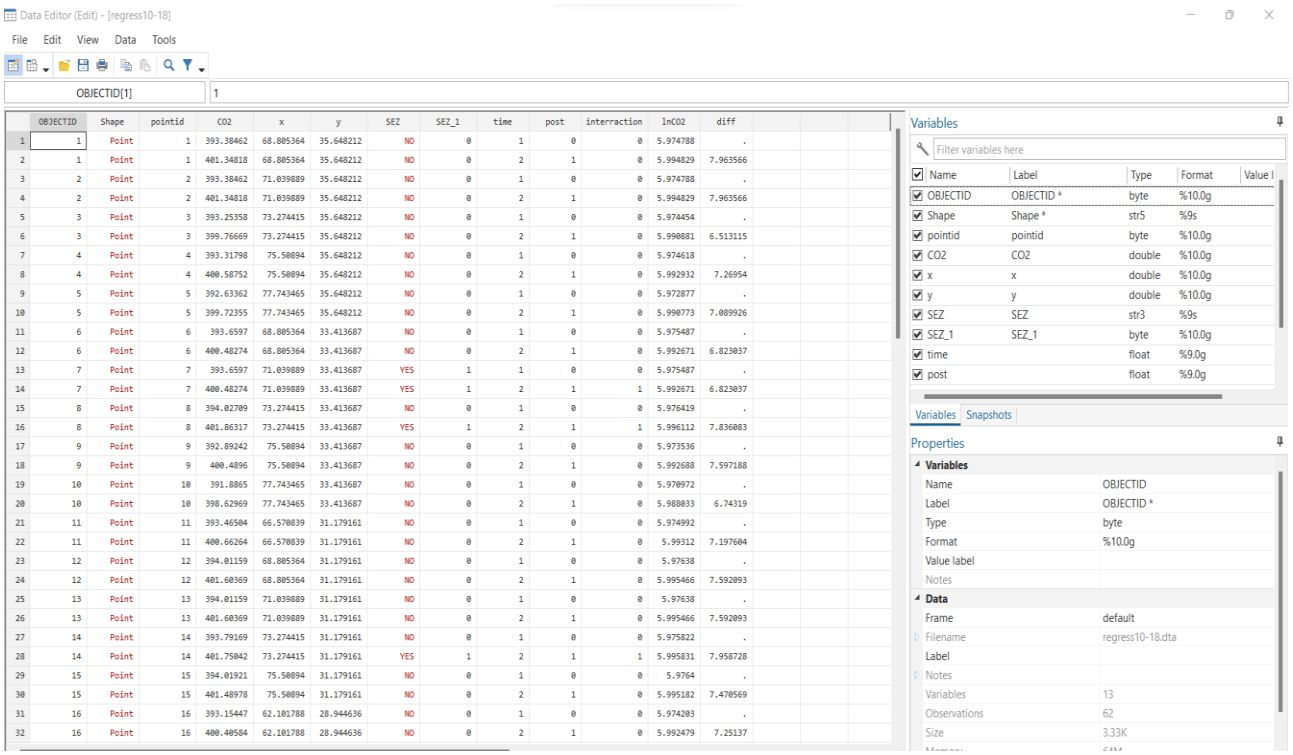
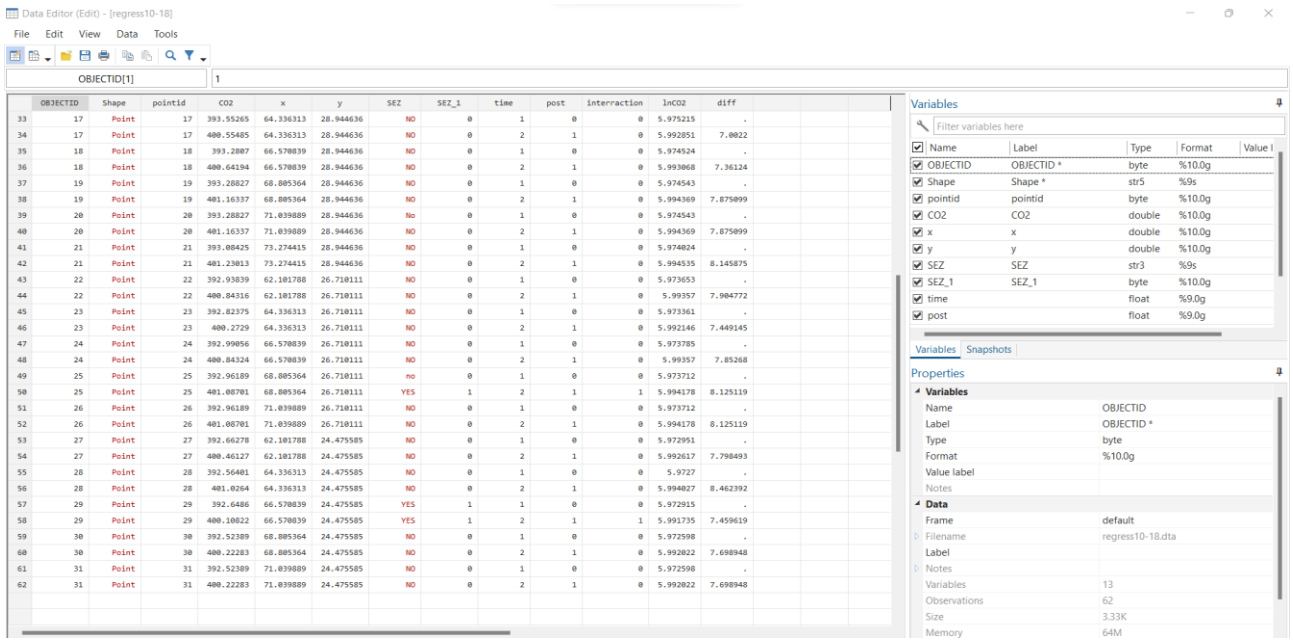
Appendixes





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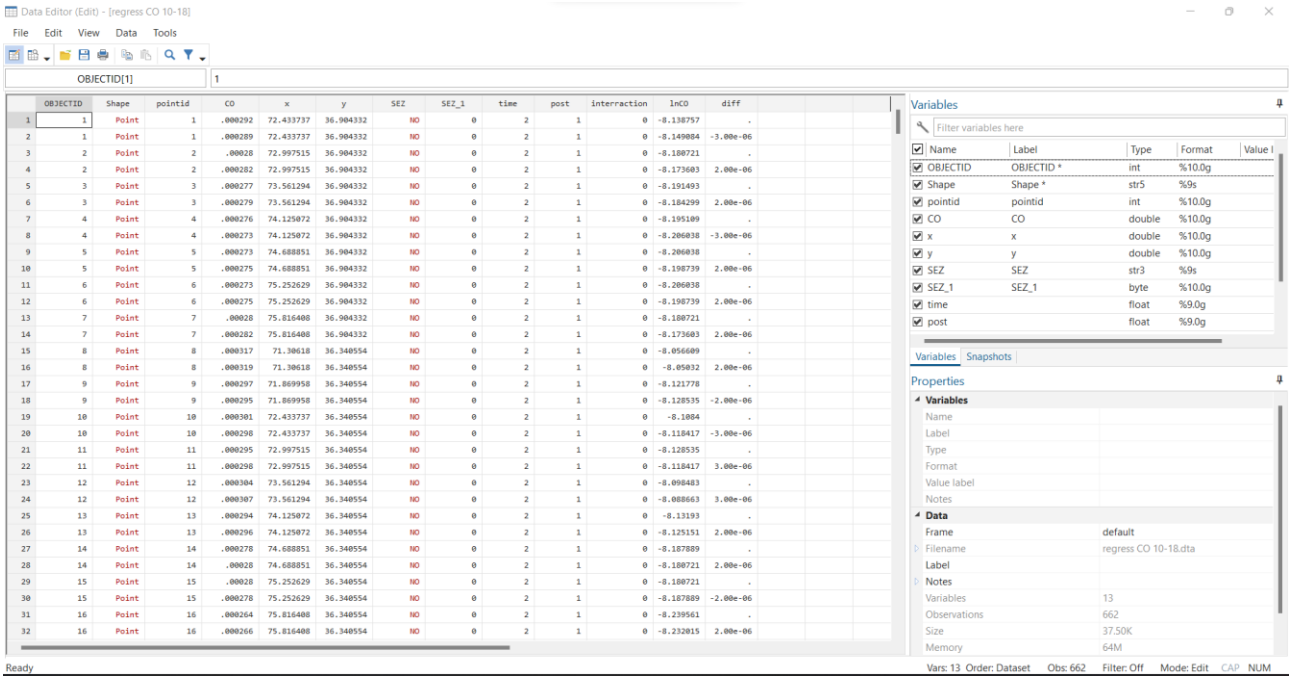

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3	2	Point	2	.00028	72.997515	36.904332	NO	0	2	1	0	-8.180721	.
4	2	Point	2	.000282	72.997515	36.904332	NO	0	2	1	0	-8.173603	2.00e-06
5	3	Point	3	.000277	73.561294	36.904332	NO	0	2	1	0	-8.191493	.
6	3	Point	3	.000279	73.561294	36.904332	NO	0	2	1	0	-8.184299	2.00e-06
7	4	Point	4	.000276	74.125072	36.904332	NO	0	2	1	0	-8.195109	.
8	4	Point	4	.000273	74.125072	36.904332	NO	0	2	1	0	-8.206038	-3.00e-06
9	5	Point	5	.000273	74.688851	36.904332	NO	0	2	1	0	-8.206038	.
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14	7	Point	7	.000282	75.816408	36.904332	NO	0	2	1	0	-8.173603	2.00e-06
15	8	Point	8	.000317	71.30618	36.340554	NO	0	2	1	0	-8.056609	.
16	8	Point	8	.000319	71.30618	36.340554	NO	0	2	1	0	-8.05032	2.00e-06
17	9	Point	9	.000297	71.869958	36.340554	NO	0	2	1	0	-8.121778	.
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23	12	Point	12	.000304	73.561294	36.340554	NO	0	2	1	0	-8.098483	.
24	12	Point	12	.000307	73.561294	36.340554	NO	0	2	1	0	-8.088663	3.00e-06
25	13	Point	13	.000294	74.125072	36.340554	NO	0	2	1	0	-8.13193	.
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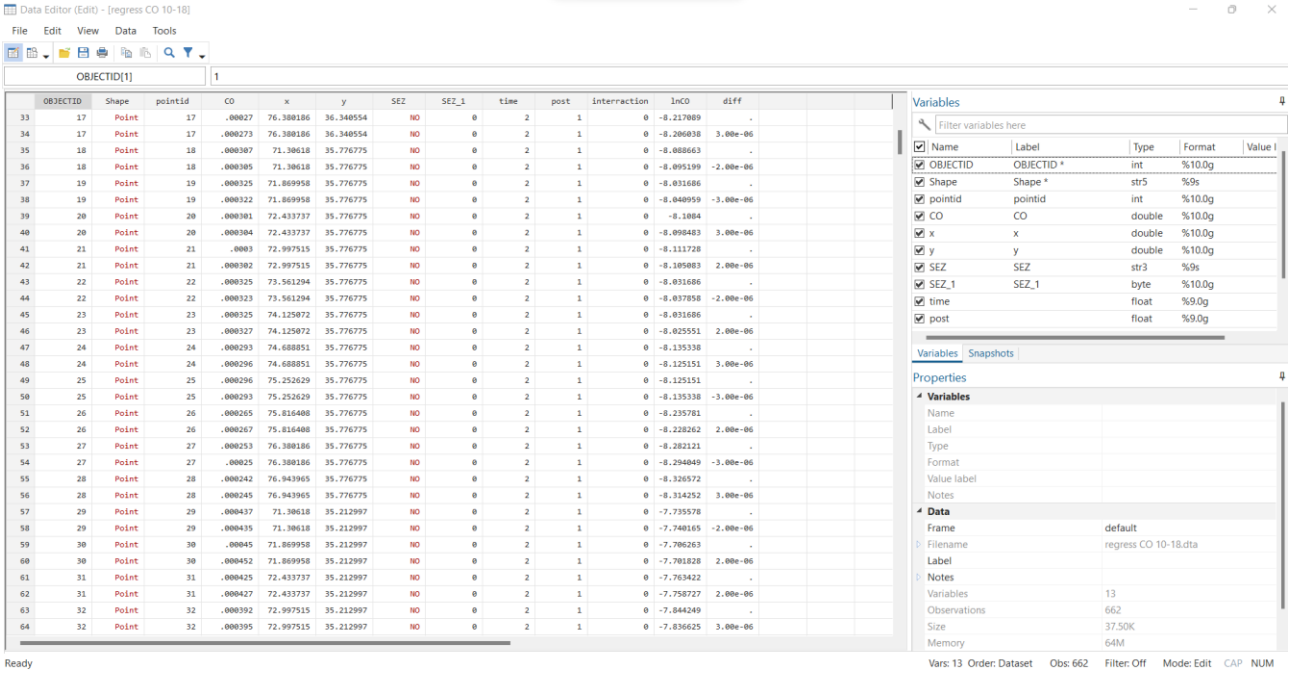

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38	19	Point	19	.000322	71.869958	35.776775	NO	0	2	1	0	-8.040959	-3.00e-06
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40	20	Point	20	.000304	72.433737	35.776775	NO	0	2	1	0	-8.098483	3.00e-06
41	21	Point	21	.0003	72.997515	35.776775	NO	0	2	1	0	-8.111728	.
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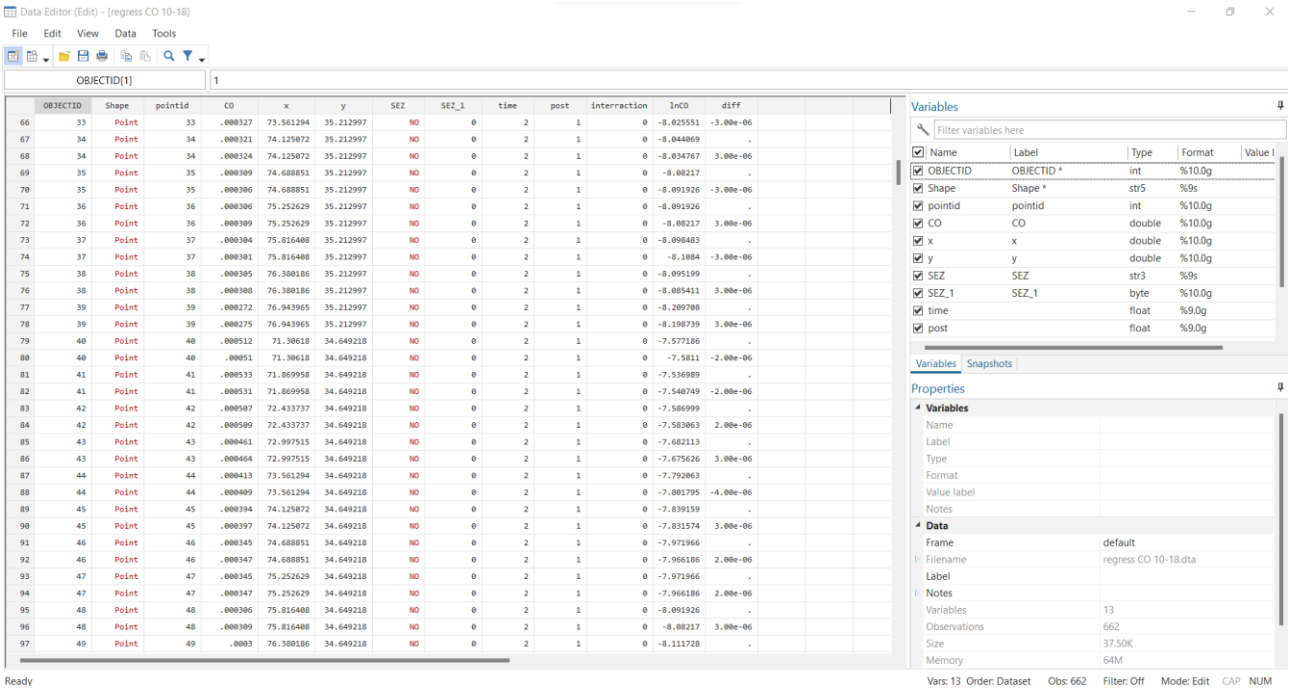

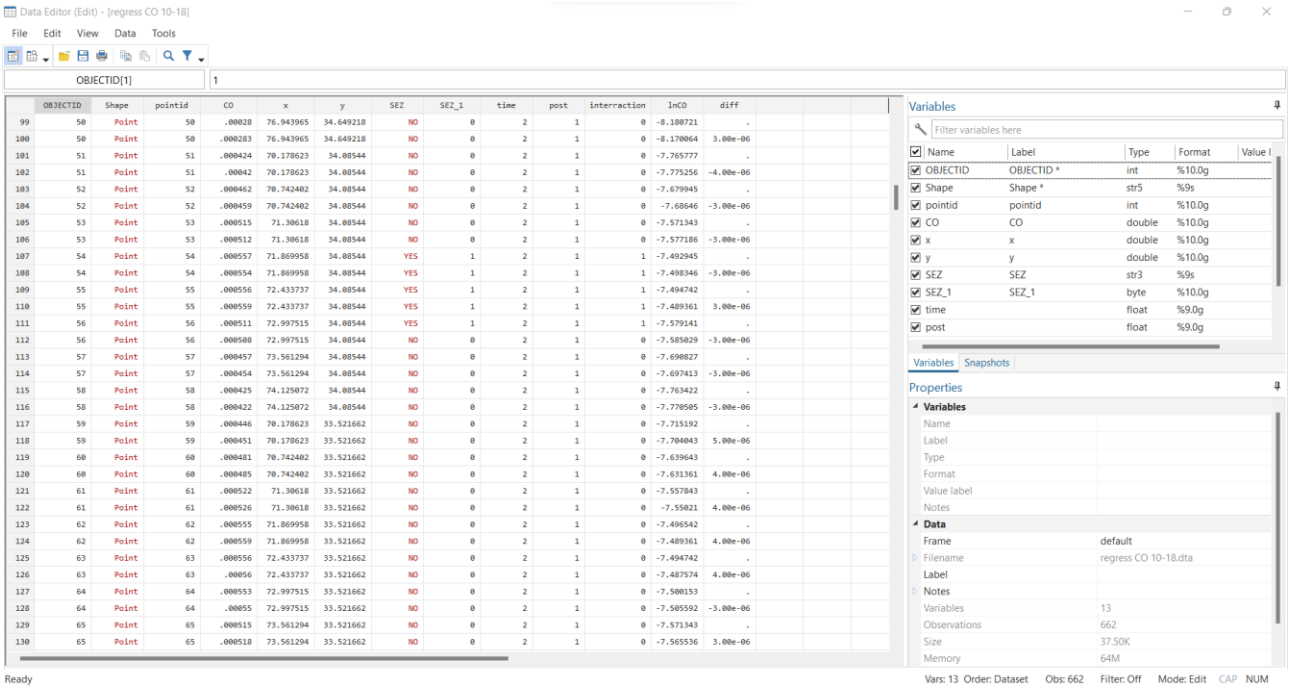

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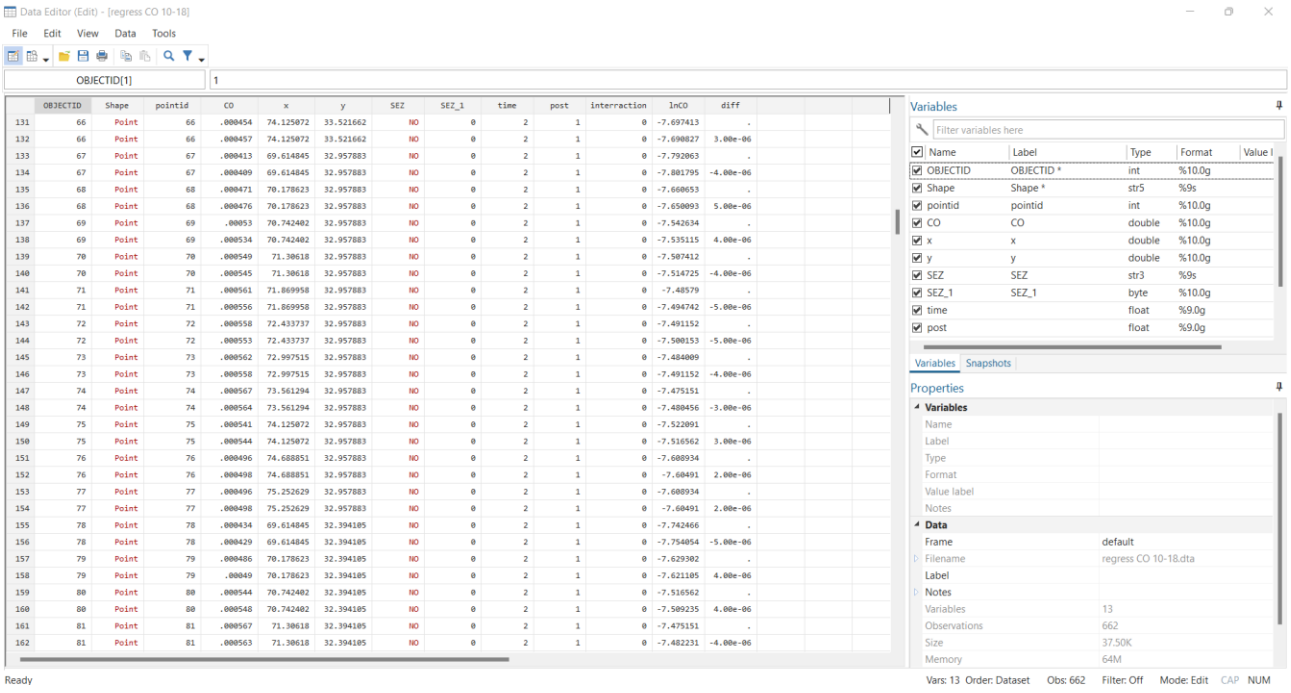

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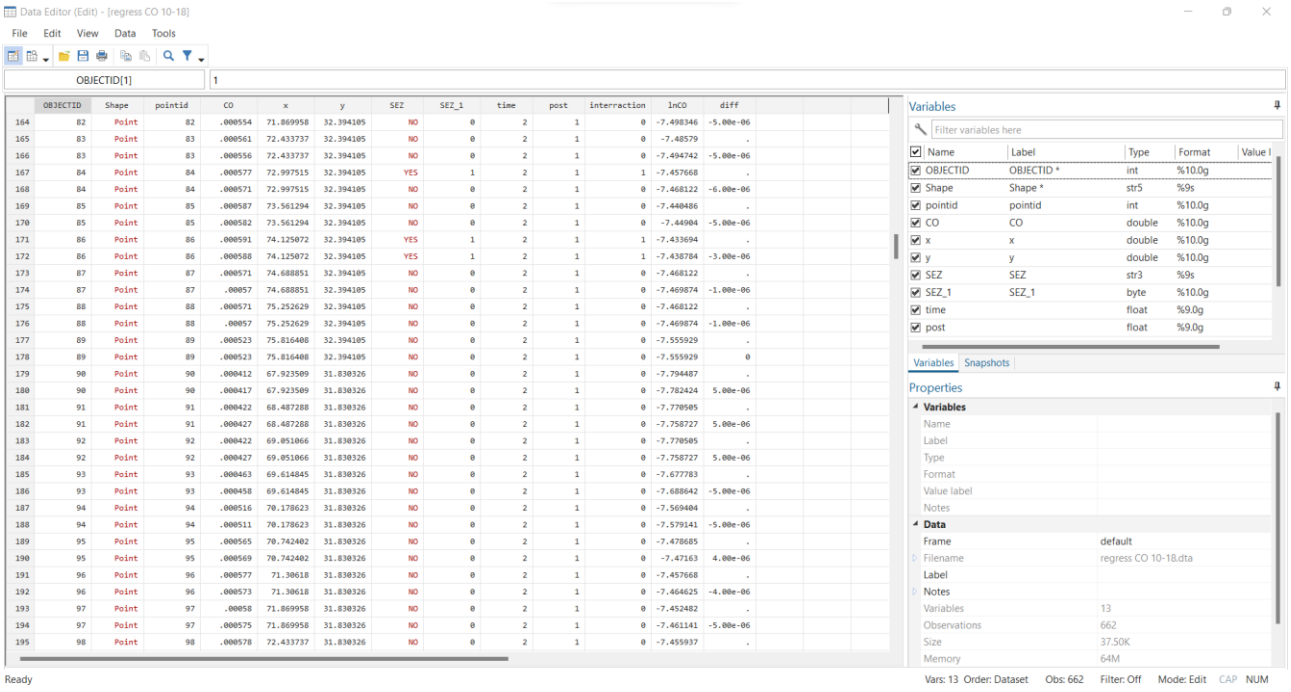
161	81	Point	81	.000567	71.30618	32.394105	NO	0	2	1	0	-7.475151	.
162	81	Point	81	.000563	71.30618	32.394105	NO	0	2	1	0	-7.482231	-4.00e-06



	OBJECTID	Shape	pointid	CO	x	y	SEZ	SEZ_1	time	post	interaction	lnCO	diff
164	82	Point	82	.000554	71.869958	32.394105	NO	0	2	1	0	-7.498346	-5.00e-06
165	83	Point	83	.000561	72.433737	32.394105	NO	0	2	1	0	-7.48579	.
166	83	Point	83	.000556	72.433737	32.394105	NO	0	2	1	0	-7.494742	-5.00e-06
167	84	Point	84	.000577	72.997515	32.394105	YES	1	2	1	1	-7.457668	.
168	84	Point	84	.000571	72.997515	32.394105	NO	0	2	1	0	-7.468122	-6.00e-06
169	85	Point	85	.000587	73.561294	32.394105	NO	0	2	1	0	-7.440486	.
170	85	Point	85	.000582	73.561294	32.394105	NO	0	2	1	0	-7.44904	-5.00e-06
171	86	Point	86	.000591	74.125072	32.394105	YES	1	2	1	1	-7.433694	.
172	86	Point	86	.000588	74.125072	32.394105	YES	1	2	1	1	-7.438784	-3.00e-06
173	87	Point	87	.000571	74.688851	32.394105	NO	0	2	1	0	-7.468122	.
174	87	Point	87	.00057	74.688851	32.394105	NO	0	2	1	0	-7.469874	-1.00e-06
175	88	Point	88	.000571	75.252629	32.394105	NO	0	2	1	0	-7.468122	.
176	88	Point	88	.00057	75.252629	32.394105	NO	0	2	1	0	-7.469874	-1.00e-06
177	89	Point	89	.000523	75.816408	32.394105	NO	0	2	1	0	-7.555929	.
178	89	Point	89	.000523	75.816408	32.394105	NO	0	2	1	0	-7.555929	0
179	90	Point	90	.000412	67.923509	31.830326	NO	0	2	1	0	-7.794487	.
180	90	Point	90	.000417	67.923509	31.830326	NO	0	2	1	0	-7.782424	5.00e-06
181	91	Point	91	.000422	68.487288	31.830326	NO	0	2	1	0	-7.770505	.
182	91	Point	91	.000427	68.487288	31.830326	NO	0	2	1	0	-7.758727	5.00e-06
183	92	Point	92	.000422	69.051066	31.830326	NO	0	2	1	0	-7.770505	.
184	92	Point	92	.000427	69.051066	31.830326	NO	0	2	1	0	-7.758727	5.00e-06
185	93	Point	93	.000463	69.614845	31.830326	NO	0	2	1	0	-7.677783	.
186	93	Point	93	.000458	69.614845	31.830326	NO	0	2	1	0	-7.688642	-5.00e-06
187	94	Point	94	.000516	70.178623	31.830326	NO	0	2	1	0	-7.569404	.
188	94	Point	94	.000511	70.178623	31.830326	NO	0	2	1	0	-7.579141	-5.00e-06
189	95	Point	95	.000565	70.742402	31.830326	NO	0	2	1	0	-7.478685	.
190	95	Point	95	.000569	70.742402	31.830326	NO	0	2	1	0	-7.47163	4.00e-06
191	96	Point	96	.000577	71.30618	31.830326	NO	0	2	1	0	-7.457668	.
192	96	Point	96	.000573	71.30618	31.830326	NO	0	2	1	0	-7.464625	-4.00e-06
193	97	Point	97	.00058	71.869958	31.830326	NO	0	2	1	0	-7.452482	.
194	97	Point	97	.000575	71.869958	31.830326	NO	0	2	1	0	-7.461141	-5.00e-06
195	98	Point	98	.000578	72.433737	31.830326	NO	0	2	1	0	-7.455937	.

Politecnico
di Torino

Data Editor (Edit) - [regress CO 10-18]

File Edit View Data Tools

OBJECTID[1] 1

	OBJECTID	Shape	pointid	CO	x	y	SEZ	SEZ_1	time	post	interaction	lnCO	diff
196	98	Point	98	.000584	72.433737	31.830326	NO	0	2	1	0	-7.44561	6.00e-06
197	99	Point	99	.000584	72.997515	31.830326	NO	0	2	1	0	-7.44561	.
198	99	Point	99	.000591	72.997515	31.830326	YES	1	2	1	1	-7.433694	7.00e-06
199	100	Point	100	.000589	73.561294	31.830326	NO	0	2	1	0	-7.437084	.
200	100	Point	100	.000597	73.561294	31.830326	YES	1	2	1	1	-7.423594	8.00e-06
201	101	Point	101	.000598	74.125072	31.830326	NO	0	2	1	0	-7.42192	.
202	101	Point	101	.000605	74.125072	31.830326	NO	0	2	1	0	-7.410282	7.00e-06
203	102	Point	102	.000599	74.688851	31.830326	NO	0	2	1	0	-7.420249	.
204	102	Point	102	.000602	74.688851	31.830326	NO	0	2	1	0	-7.415253	3.00e-06
205	103	Point	103	.000599	75.252629	31.830326	NO	0	2	1	0	-7.420249	.
206	103	Point	103	.000602	75.252629	31.830326	NO	0	2	1	0	-7.415253	3.00e-06
207	104	Point	104	.000585	75.816408	31.830326	NO	0	2	1	0	-7.443899	.
208	104	Point	104	.000586	75.816408	31.830326	NO	0	2	1	0	-7.442191	1.00e-06
209	105	Point	105	.000414	67.359731	31.266548	NO	0	2	1	0	-7.789645	.
210	105	Point	105	.00042	67.359731	31.266548	NO	0	2	1	0	-7.775256	6.00e-06
211	106	Point	106	.000418	67.923509	31.266548	NO	0	2	1	0	-7.780029	.
212	106	Point	106	.000413	67.923509	31.266548	NO	0	2	1	0	-7.792063	-5.00e-06
213	107	Point	107	.000433	68.487288	31.266548	NO	0	2	1	0	-7.744773	.
214	107	Point	107	.000427	68.487288	31.266548	NO	0	2	1	0	-7.758727	-6.00e-06
215	108	Point	108	.000433	69.051066	31.266548	NO	0	2	1	0	-7.744773	.
216	108	Point	108	.000427	69.051066	31.266548	NO	0	2	1	0	-7.758727	-6.00e-06
217	109	Point	109	.000456	69.614845	31.266548	NO	0	2	1	0	-7.693018	.
218	109	Point	109	.00045	69.614845	31.266548	NO	0	2	1	0	-7.706263	-6.00e-06
219	110	Point	110	.000495	70.178623	31.266548	NO	0	2	1	0	-7.610953	.
220	110	Point	110	.00049	70.178623	31.266548	NO	0	2	1	0	-7.621105	-5.00e-06
221	111	Point	111	.00057	70.742402	31.266548	NO	0	2	1	0	-7.469874	.
222	111	Point	111	.000566	70.742402	31.266548	NO	0	2	1	0	-7.476916	-4.00e-06
223	112	Point	112	.000576	71.30618	31.266548	NO	0	2	1	0	-7.459403	.
224	112	Point	112	.000581	71.30618	31.266548	NO	0	2	1	0	-7.45076	5.00e-06
225	113	Point	113	.000579	71.869958	31.266548	NO	0	2	1	0	-7.454208	.
226	113	Point	113	.000585	71.869958	31.266548	NO	0	2	1	0	-7.443899	6.00e-06
227	114	Point	114	.000587	72.433737	31.266548	NO	0	2	1	0	-7.440486	.

Variables

Filter variables here

Name	Label	Type	Format	Value l
OBJECTID	OBJECTID *	int	%10.0g	
Shape	Shape *	str5	%9s	
pointid	pointid	int	%10.0g	
CO	CO	double	%10.0g	
x	x	double	%10.0g	
y	y	double	%10.0g	
SEZ	SEZ	str3	%9s	
SEZ_1	SEZ_1	byte	%10.0g	
time		float	%9.0g	
post		float	%9.0g	

Variables Snapshots

Properties

Variables
- Name
- Label
- Type
- Format
- Value label
- Notes

Data
- Frame: default
- Filename: regress CO 10-18.dta
- Label
- Notes
- Variables: 13
- Observations: 662
- Size: 37.50K
- Memory: 64M

Ready

Vars: 13 Order: Dataset Obs: 662 Filter: Off Mode: Edit CAP NUM

Data Editor (Edit) - [regress CO 10-18]

File Edit View Data Tools

OBJECTID[1] 1

	OBJECTID	Shape	pointid	CO	x	y	SEZ	SEZ_1	time	post	interaction	lnCO	diff
228	114	Point	114	.00058	72.433737	31.266548	NO	0	2	1	0	-7.452482	-7.00e-06
229	115	Point	115	.000587	72.997515	31.266548	NO	0	2	1	0	-7.440486	.
230	115	Point	115	.000595	72.997515	31.266548	YES	1	2	1	1	-7.426949	8.00e-06
231	116	Point	116	.00059	73.561294	31.266548	NO	0	2	1	0	-7.435388	.
232	116	Point	116	.0006	73.561294	31.266548	YES	1	2	1	1	-7.418581	1.00e-05
233	117	Point	117	.000612	74.125072	31.266548	NO	0	2	1	0	-7.398778	.
234	117	Point	117	.000602	74.125072	31.266548	NO	0	2	1	0	-7.415253	-1.00e-05
235	118	Point	118	.000466	66.232174	30.702769	NO	0	2	1	0	-7.671325	.
236	118	Point	118	.000473	66.232174	30.702769	NO	0	2	1	0	-7.656415	7.00e-06
237	119	Point	119	.000436	66.795952	30.702769	NO	0	2	1	0	-7.737868	.
238	119	Point	119	.000443	66.795952	30.702769	NO	0	2	1	0	-7.721941	7.00e-06
239	120	Point	120	.000426	67.359731	30.702769	NO	0	2	1	0	-7.761071	.
240	120	Point	120	.00042	67.359731	30.702769	NO	0	2	1	0	-7.775256	-6.00e-06
241	121	Point	121	.000429	67.923509	30.702769	NO	0	2	1	0	-7.754054	.
242	121	Point	121	.000435	67.923509	30.702769	NO	0	2	1	0	-7.740165	6.00e-06
243	122	Point	122	.000466	68.487288	30.702769	NO	0	2	1	0	-7.671325	.
244	122	Point	122	.00046	68.487288	30.702769	NO	0	2	1	0	-7.684284	-6.00e-06
245	123	Point	123	.00046	69.051066	30.702769	NO	0	2	1	0	-7.684284	.
246	123	Point	123	.000466	69.051066	30.702769	NO	0	2	1	0	-7.671325	6.00e-06
247	124	Point	124	.000475	69.614845	30.702769	NO	0	2	1	0	-7.652196	.
248	124	Point	124	.000469	69.614845	30.702769	NO	0	2	1	0	-7.664908	-6.00e-06
249	125	Point	125	.000496	70.178623	30.702769	NO	0	2	1	0	-7.608934	.
250	125	Point	125	.000501	70.178623	30.702769	NO	0	2	1	0	-7.598905	5.00e-06
251	126	Point	126	.000558	70.742402	30.702769	NO	0	2	1	0	-7.491152	.
252	126	Point	126	.000563	70.742402	30.702769	NO	0	2	1	0	-7.482231	5.00e-06
253	127	Point	127	.000588	71.30618	30.702769	NO	0	2	1	0	-7.438784	.
254	127	Point	127	.000582	71.30618	30.702769	NO	0	2	1	0	-7.44904	-6.00e-06
255	128	Point	128	.00059	71.869958	30.702769	NO	0	2	1	0	-7.435388	.
256	128	Point	128	.000583	71.869958	30.702769	NO	0	2	1	0	-7.447323	-7.00e-06
257	129	Point	129	.000581	72.433737	30.702769	NO	0	2	1	0	-7.45076	.
258	129	Point	129	.000589	72.433737	30.702769	NO	0	2	1	0	-7.437084	8.00e-06
259	130	Point	130	.000591	72.997515	30.702769	NO	0	2	1	0	-7.433694	.

Variables

Filter variables here

Name	Label	Type	Format	Value l
OBJECTID	OBJECTID *	int	%10.0g	
Shape	Shape *	str5	%9s	
pointid	pointid	int	%10.0g	
CO	CO	double	%10.0g	
x	x	double	%10.0g	
y	y	double	%10.0g	
SEZ	SEZ	str3	%9s	
SEZ_1	SEZ_1	byte	%10.0g	
time		float	%9.0g	
post		float	%9.0g	

Variables Snapshots

Properties

Variables
- Name
- Label
- Type
- Format
- Value label
- Notes

Data
- Frame: default
- Filename: regress CO 10-18.dta
- Label
- Notes
- Variables: 13
- Observations: 662
- Size: 37.50K
- Memory: 64M

Ready

Vars: 13 Order: Dataset Obs: 662 Filter: Off Mode: Edit CAP NUM

Politecnico di Torino

Data Editor (Edit) - [regress CO 10-18]

File Edit View Data Tools

OBJECTID[1] 1

	OBJECTID	Shape	pointid	CO	x	y	SEZ	SEZ_1	time	post	interaction	lnCO	diff
260	130	Point	130	.000581	72.997515	30.702769	NO	0	2	1	0	-7.45076	-1.00e-05
261	131	Point	131	.000583	73.561294	30.702769	NO	0	2	1	0	-7.447323	.
262	131	Point	131	.000594	73.561294	30.702769	NO	0	2	1	0	-7.428631	.000011
263	132	Point	132	.00059	74.125072	30.702769	NO	0	2	1	0	-7.435388	.
264	132	Point	132	.000602	74.125072	30.702769	NO	0	2	1	0	-7.415253	.000012
265	133	Point	133	.000482	60.594389	30.138991	NO	0	2	1	0	-7.637567	.
266	133	Point	133	.000487	60.594389	30.138991	NO	0	2	1	0	-7.627246	5.00e-06
267	134	Point	134	.000541	61.158168	30.138991	NO	0	2	1	0	-7.522091	.
268	134	Point	134	.000534	61.158168	30.138991	NO	0	2	1	0	-7.535115	-7.00e-06
269	135	Point	135	.000474	66.232174	30.138991	NO	0	2	1	0	-7.654303	.
270	135	Point	135	.000467	66.232174	30.138991	NO	0	2	1	0	-7.669181	-7.00e-06
271	136	Point	136	.000438	66.795952	30.138991	NO	0	2	1	0	-7.733292	.
272	136	Point	136	.000445	66.795952	30.138991	NO	0	2	1	0	-7.717436	7.00e-06
273	137	Point	137	.000477	67.359731	30.138991	NO	0	2	1	0	-7.647994	.
274	137	Point	137	.000471	67.359731	30.138991	NO	0	2	1	0	-7.660653	-6.00e-06
275	138	Point	138	.000489	67.923509	30.138991	NO	0	2	1	0	-7.623148	.
276	138	Point	138	.000496	67.923509	30.138991	NO	0	2	1	0	-7.608934	7.00e-06
277	139	Point	139	.000492	68.487288	30.138991	NO	0	2	1	0	-7.617032	.
278	139	Point	139	.000485	68.487288	30.138991	NO	0	2	1	0	-7.631361	-7.00e-06
279	140	Point	140	.000485	69.051066	30.138991	NO	0	2	1	0	-7.631361	.
280	140	Point	140	.000492	69.051066	30.138991	NO	0	2	1	0	-7.617032	7.00e-06
281	141	Point	141	.00048	69.614845	30.138991	NO	0	2	1	0	-7.641725	.
282	141	Point	141	.000486	69.614845	30.138991	NO	0	2	1	0	-7.629302	6.00e-06
283	142	Point	142	.000513	70.178623	30.138991	NO	0	2	1	0	-7.575235	.
284	142	Point	142	.000508	70.178623	30.138991	NO	0	2	1	0	-7.585029	-5.00e-06
285	143	Point	143	.000574	70.742402	30.138991	NO	0	2	1	0	-7.462881	.
286	143	Point	143	.000569	70.742402	30.138991	NO	0	2	1	0	-7.47163	-5.00e-06
287	144	Point	144	.000584	71.30618	30.138991	NO	0	2	1	0	-7.44561	.
288	144	Point	144	.00059	71.30618	30.138991	NO	0	2	1	0	-7.435388	6.00e-06
289	145	Point	145	.000589	71.869958	30.138991	NO	0	2	1	0	-7.437084	.
290	145	Point	145	.000582	71.869958	30.138991	NO	0	2	1	0	-7.44904	-7.00e-06
291	146	Point	146	.000578	72.433737	30.138991	NO	0	2	1	0	-7.455937	.

Variables

Filter variables here

Name	Label	Type	Format	Value l
OBJECTID	OBJECTID *	int	%10.0g	
Shape	Shape *	str5	%9s	
pointid	pointid	int	%10.0g	
CO	CO	double	%10.0g	
x	x	double	%10.0g	
y	y	double	%10.0g	
SEZ	SEZ	str3	%9s	
SEZ_1	SEZ_1	byte	%10.0g	
time		float	%9.0g	
post		float	%9.0g	

Variables Snapshots

Properties

Variables
- Name
- Label
- Type
- Format
- Value label
- Notes

Data
- Frame: default
- Filename: regress CO 10-18.dta
- Label
- Notes
- Variables: 13
- Observations: 662
- Size: 37.50K
- Memory: 64M

Ready

Vars: 13 Order: Dataset Obs: 662 Filter: Off Mode: Edit CAP NUM

Data Editor (Edit) - [regress CO 10-18]

File Edit View Data Tools

OBJECTID[1] 1

	OBJECTID	Shape	pointid	CO	x	y	SEZ	SEZ_1	time	post	interaction	lnCO	diff
292	146	Point	146	.000587	72.433737	30.138991	NO	0	2	1	0	-7.440486	9.00e-06
293	147	Point	147	.000578	72.997515	30.138991	NO	0	2	1	0	-7.455937	.
294	147	Point	147	.000588	72.997515	30.138991	NO	0	2	1	0	-7.438784	1.00e-05
295	148	Point	148	.00059	73.561294	30.138991	NO	0	2	1	0	-7.435388	.
296	148	Point	148	.000579	73.561294	30.138991	NO	0	2	1	0	-7.454208	-.000011
297	149	Point	149	.000462	60.594389	29.575212	NO	0	2	1	0	-7.679945	.
298	149	Point	149	.000456	60.594389	29.575212	NO	0	2	1	0	-7.693018	-6.00e-06
299	150	Point	150	.000497	61.158168	29.575212	NO	0	2	1	0	-7.606921	.
300	150	Point	150	.000491	61.158168	29.575212	NO	0	2	1	0	-7.619066	-6.00e-06
301	151	Point	151	.000524	61.721946	29.575212	NO	0	2	1	0	-7.554019	.
302	151	Point	151	.000531	61.721946	29.575212	NO	0	2	1	0	-7.540749	7.00e-06
303	152	Point	152	.000518	62.285725	29.575212	NO	0	2	1	0	-7.565536	.
304	152	Point	152	.000511	62.285725	29.575212	NO	0	2	1	0	-7.579141	-7.00e-06
305	153	Point	153	.000496	62.849503	29.575212	NO	0	2	1	0	-7.608934	.
306	153	Point	153	.000489	62.849503	29.575212	NO	0	2	1	0	-7.623148	-7.00e-06
307	154	Point	154	.000489	63.413282	29.575212	NO	0	2	1	0	-7.623148	.
308	154	Point	154	.000496	63.413282	29.575212	NO	0	2	1	0	-7.608934	7.00e-06
309	155	Point	155	.000476	63.97706	29.575212	NO	0	2	1	0	-7.650093	.
310	155	Point	155	.000469	63.97706	29.575212	NO	0	2	1	0	-7.664908	-7.00e-06
311	156	Point	156	.000481	64.540838	29.575212	NO	0	2	1	0	-7.639643	.
312	156	Point	156	.000474	64.540838	29.575212	NO	0	2	1	0	-7.654303	-7.00e-06
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Variables

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Variables Snapshots

Properties

Variables
- Name
- Label
- Type
- Format
- Value label
- Notes

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- Frame: default
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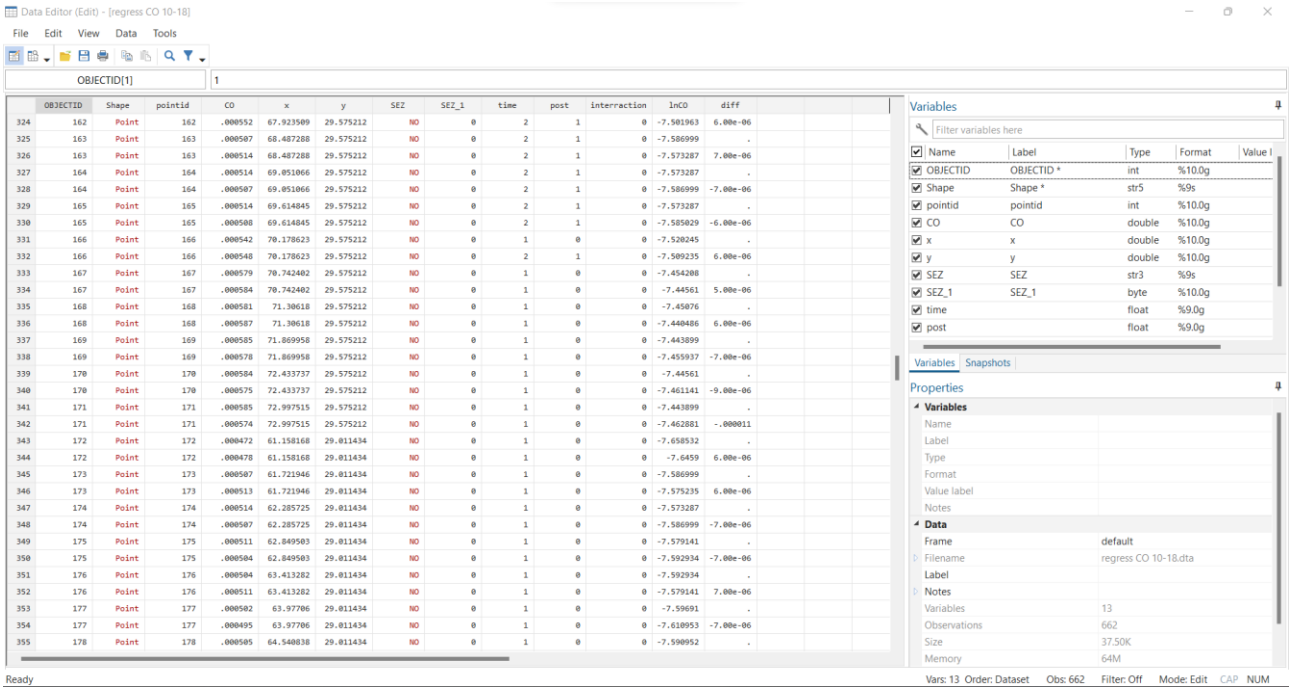
Politecnico di Torino



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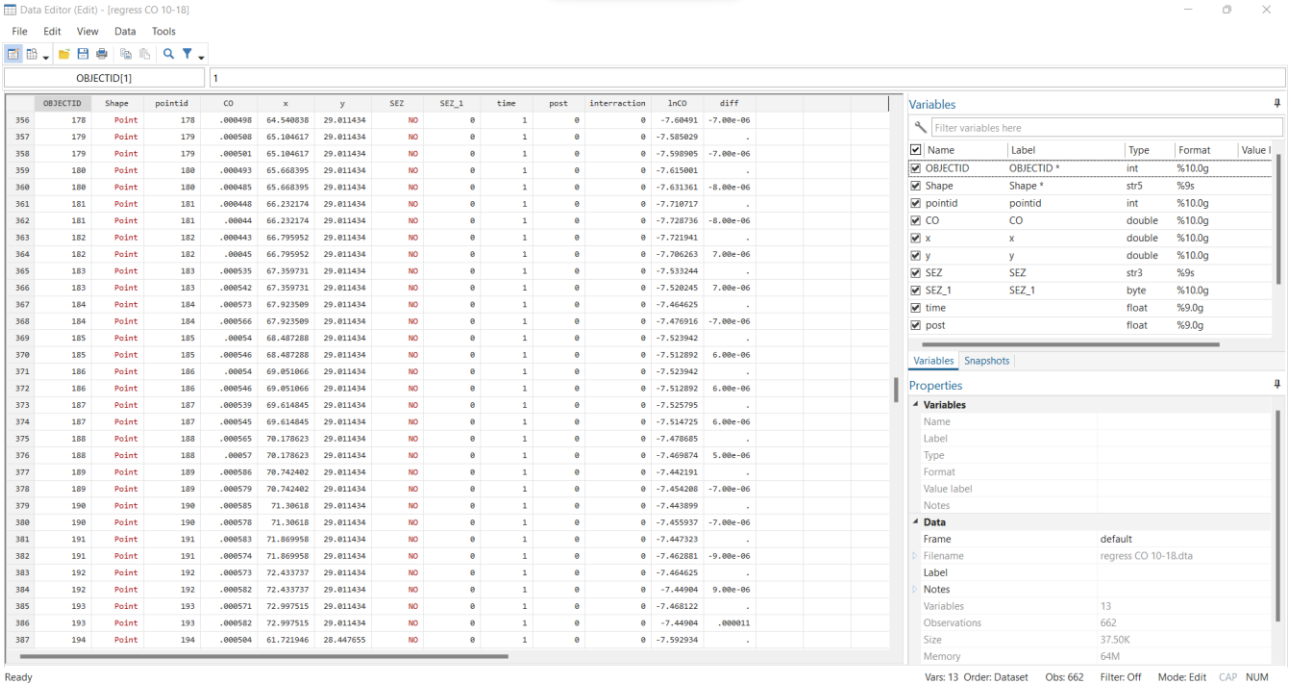

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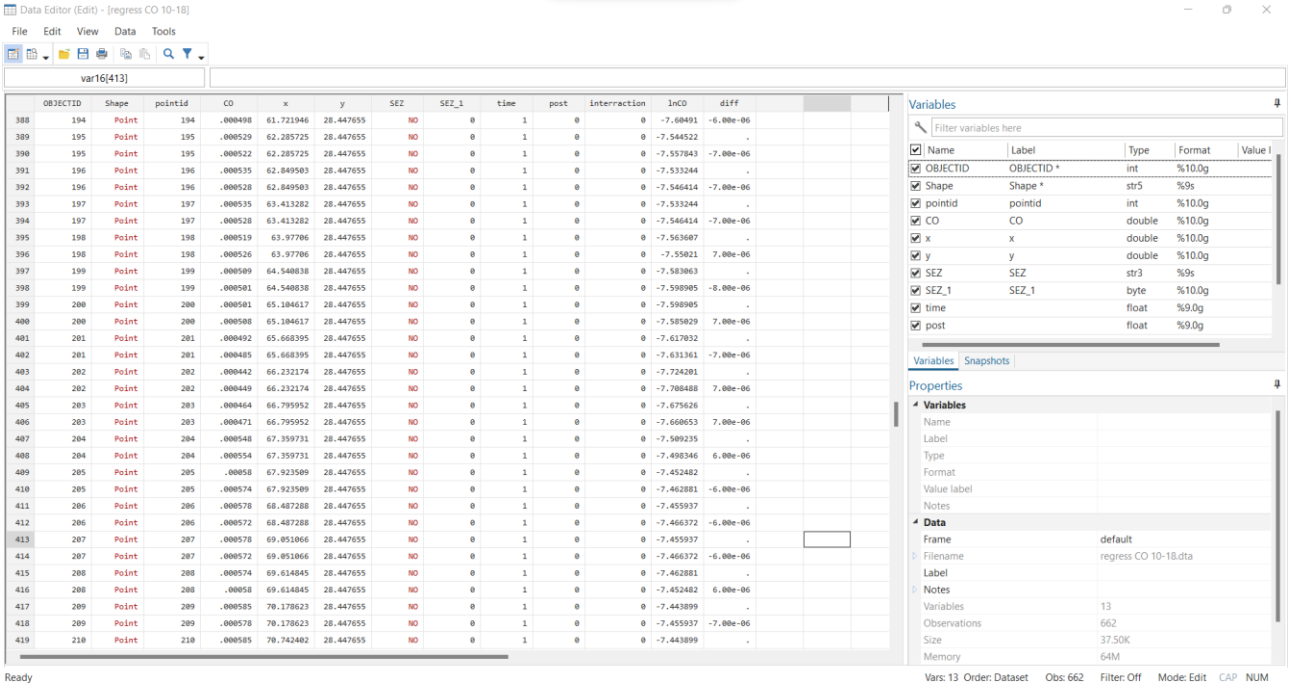

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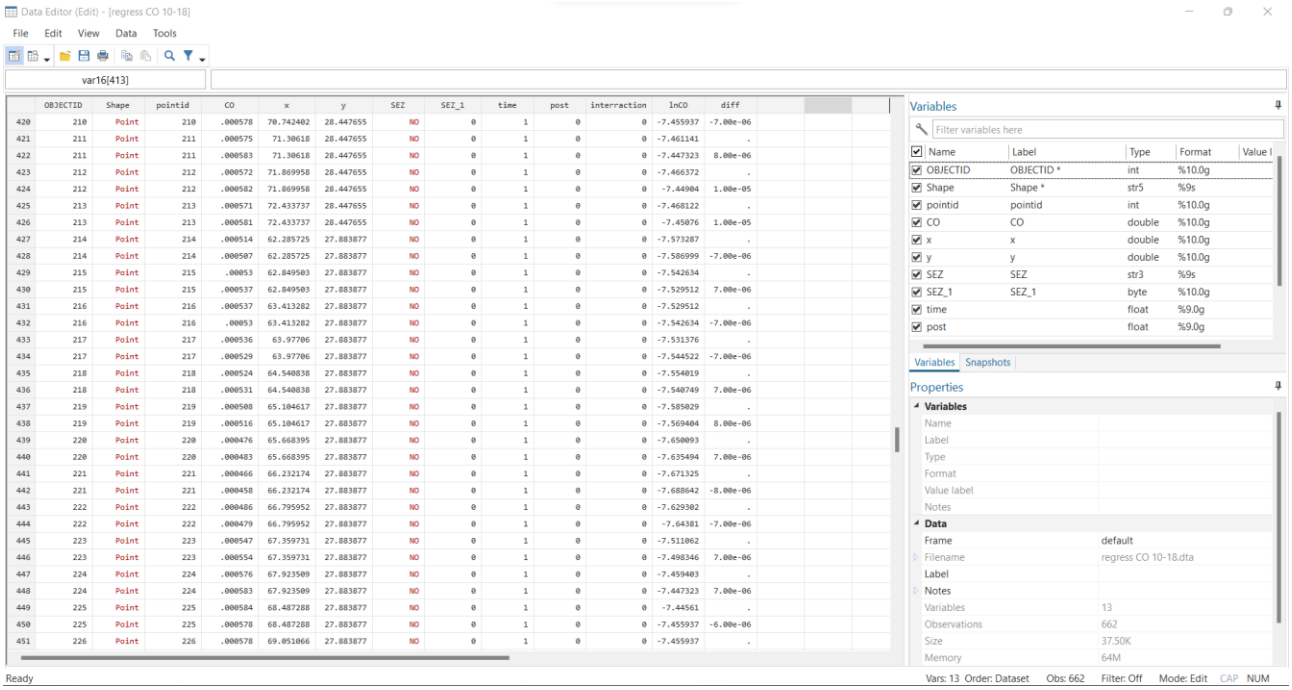

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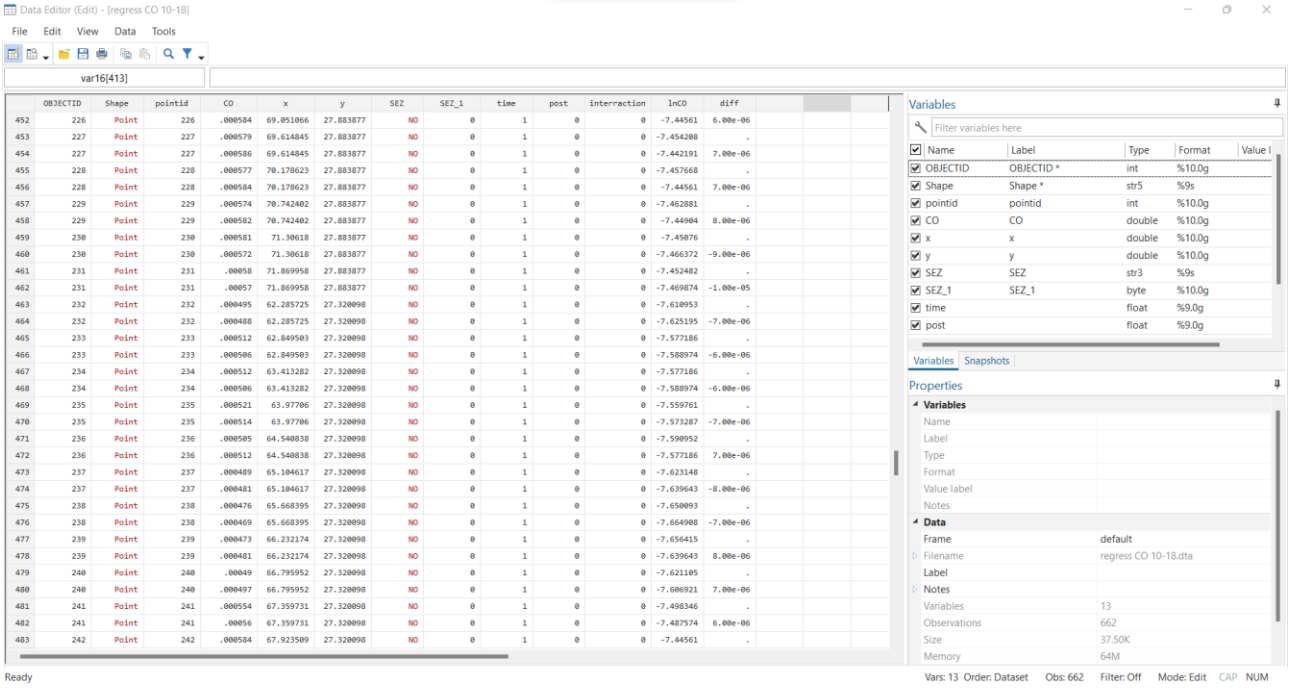
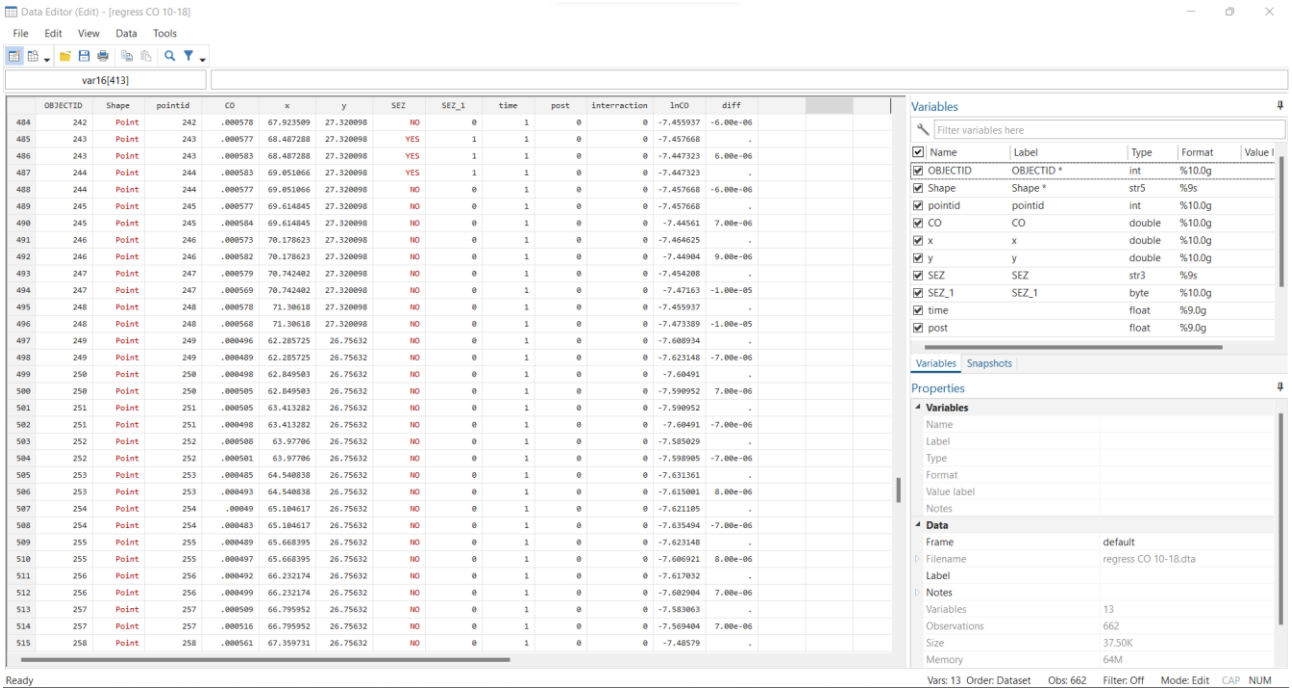
Politecnico di Torino

1859





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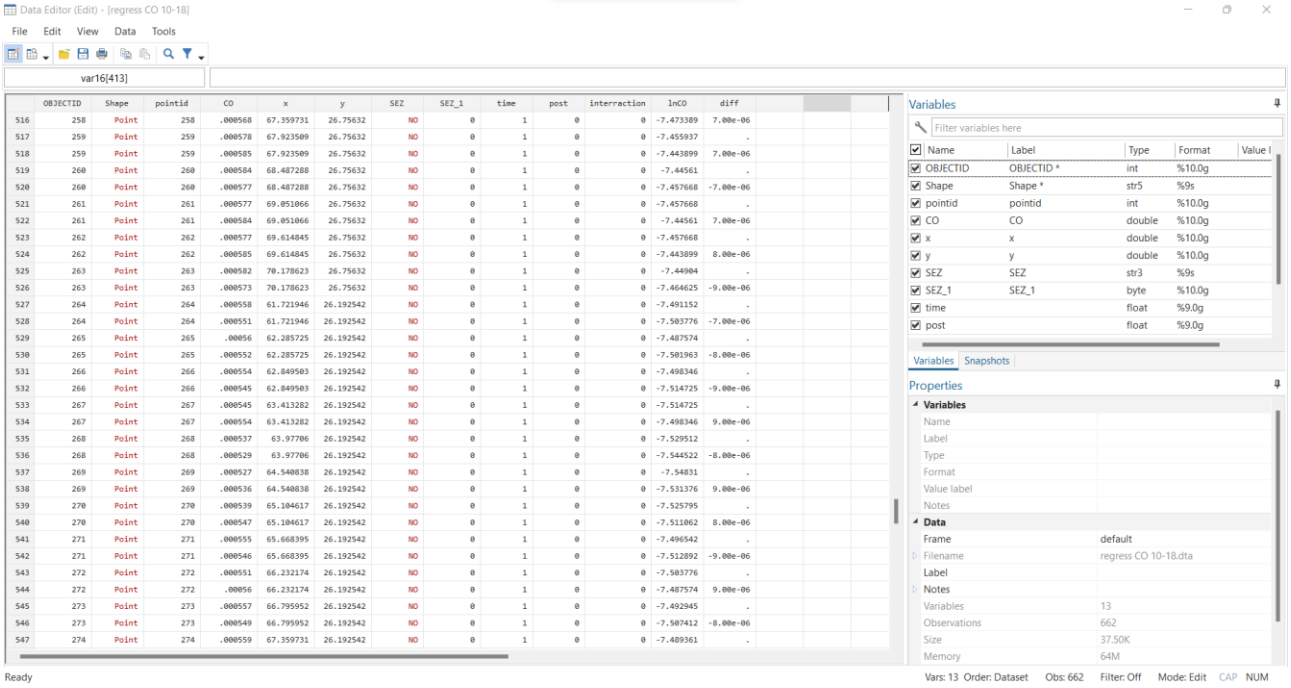

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523	262	Point	262	.000577	69.614845	26.75632	NO	0	1	0	0	-7.457668	.
524	262	Point	262	.000585	69.614845	26.75632	NO	0	1	0	0	-7.443899	8.00e-06
525	263	Point	263	.000582	70.178623	26.75632	NO	0	1	0	0	-7.44904	.
526	263	Point	263	.000573	70.178623	26.75632	NO	0	1	0	0	-7.464625	-9.00e-06
527	264	Point	264	.000558	61.721946	26.192542	NO	0	1	0	0	-7.491152	.
528	264	Point	264	.000551	61.721946	26.192542	NO	0	1	0	0	-7.503776	-7.00e-06
529	265	Point	265	.00056	62.285725	26.192542	NO	0	1	0	0	-7.487574	.
530	265	Point	265	.000552	62.285725	26.192542	NO	0	1	0	0	-7.501963	-8.00e-06
531	266	Point	266	.000554	62.849503	26.192542	NO	0	1	0	0	-7.498346	.
532	266	Point	266	.000545	62.849503	26.192542	NO	0	1	0	0	-7.514725	-9.00e-06
533	267	Point	267	.000545	63.413282	26.192542	NO	0	1	0	0	-7.514725	.
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535	268	Point	268	.000537	63.97706	26.192542	NO	0	1	0	0	-7.529512	.
536	268	Point	268	.000529	63.97706	26.192542	NO	0	1	0	0	-7.544522	-8.00e-06
537	269	Point	269	.000527	64.540838	26.192542	NO	0	1	0	0	-7.54831	.
538	269	Point	269	.000536	64.540838	26.192542	NO	0	1	0	0	-7.531376	9.00e-06
539	270	Point	270	.000539	65.104617	26.192542	NO	0	1	0	0	-7.525795	.
540	270	Point	270	.000547	65.104617	26.192542	NO	0	1	0	0	-7.511062	8.00e-06
541	271	Point	271	.000555	65.668395	26.192542	NO	0	1	0	0	-7.496542	.
542	271	Point	271	.000546	65.668395	26.192542	NO	0	1	0	0	-7.512892	-9.00e-06
543	272	Point	272	.000551	66.232174	26.192542	NO	0	1	0	0	-7.503776	.
544	272	Point	272	.00056	66.232174	26.192542	NO	0	1	0	0	-7.487574	9.00e-06
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546	273	Point	273	.000549	66.795952	26.192542	NO	0	1	0	0	-7.507412	-8.00e-06
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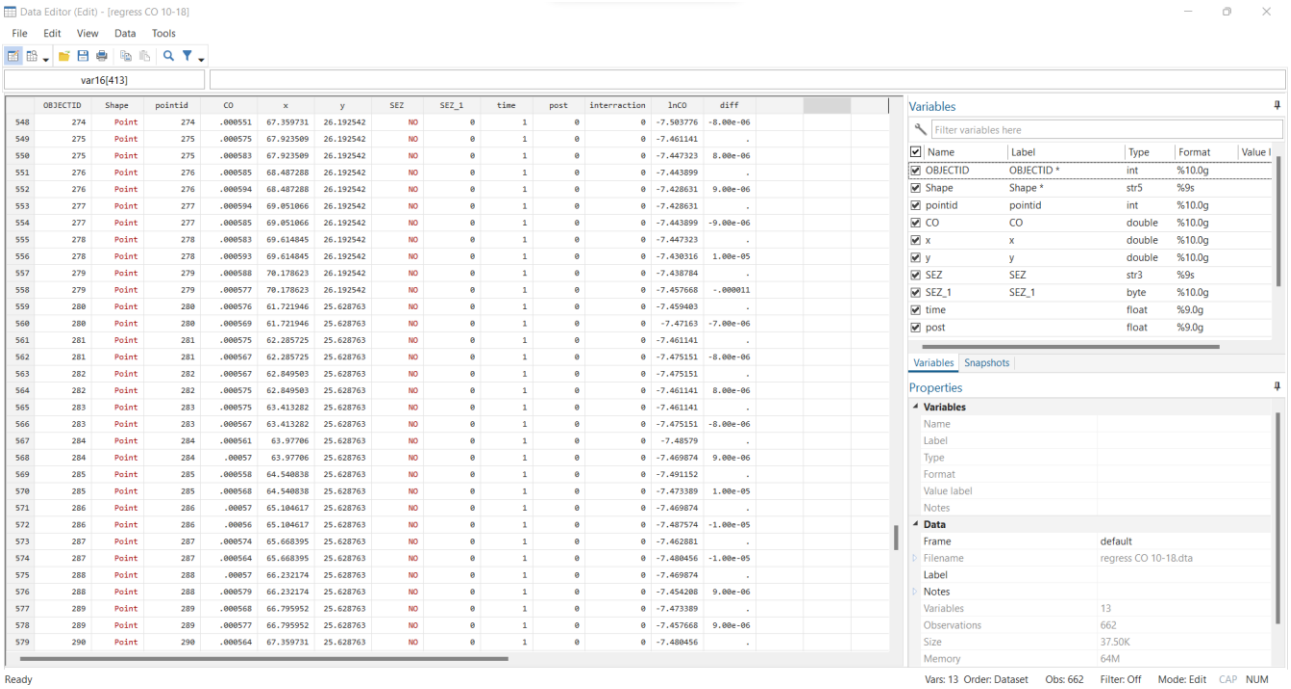

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549	275	Point	275	.000575	67.923509	26.192542	NO	0	1	0	0	-7.461141	.
550	275	Point	275	.000583	67.923509	26.192542	NO	0	1	0	0	-7.447323	8.00e-06
551	276	Point	276	.000585	68.487288	26.192542	NO	0	1	0	0	-7.443899	.
552	276	Point	276	.000594	68.487288	26.192542	NO	0	1	0	0	-7.428631	9.00e-06
553	277	Point	277	.000594	69.051066	26.192542	NO	0	1	0	0	-7.428631	.
554	277	Point	277	.000585	69.051066	26.192542	NO	0	1	0	0	-7.443899	-9.00e-06
555	278	Point	278	.000583	69.614845	26.192542	NO	0	1	0	0	-7.447323	.
556	278	Point	278	.000593	69.614845	26.192542	NO	0	1	0	0	-7.430316	1.00e-05
557	279	Point	279	.000588	70.178623	26.192542	NO	0	1	0	0	-7.438784	.
558	279	Point	279	.000577	70.178623	26.192542	NO	0	1	0	0	-7.457668	-.000011
559	280	Point	280	.000576	61.721946	25.628763	NO	0	1	0	0	-7.459403	.
560	280	Point	280	.000569	61.721946	25.628763	NO	0	1	0	0	-7.47163	-7.00e-06
561	281	Point	281	.000575	62.285725	25.628763	NO	0	1	0	0	-7.461141	.
562	281	Point	281	.000567	62.285725	25.628763	NO	0	1	0	0	-7.475151	-8.00e-06
563	282	Point	282	.000567	62.849503	25.628763	NO	0	1	0	0	-7.475151	.
564	282	Point	282	.000575	62.849503	25.628763	NO	0	1	0	0	-7.461141	8.00e-06
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566	283	Point	283	.000567	63.413282	25.628763	NO	0	1	0	0	-7.475151	-8.00e-06
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568	284	Point	284	.00057	63.97706	25.628763	NO	0	1	0	0	-7.469874	9.00e-06
569	285	Point	285	.000558	64.540838	25.628763	NO	0	1	0	0	-7.491152	.
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572	286	Point	286	.00056	65.104617	25.628763	NO	0	1	0	0	-7.487574	-1.00e-05
573	287	Point	287	.000574	65.668395	25.628763	NO	0	1	0	0	-7.462881	.
574	287	Point	287	.000564	65.668395	25.628763	NO	0	1	0	0	-7.480456	-1.00e-05
575	288	Point	288	.00057	66.232174	25.628763	NO	0	1	0	0	-7.469874	.
576	288	Point	288	.000579	66.232174	25.628763	NO	0	1	0	0	-7.454208	9.00e-06
577	289	Point	289	.000568	66.795952	25.628763	NO	0	1	0	0	-7.473389	.
578	289	Point	289	.000577	66.795952	25.628763	NO	0	1	0	0	-7.457668	9.00e-06
579	290	Point	290	.000564	67.359731	25.628763	NO	0	1	0	0	-7.480456	.

Politecnico di Torino

Data Editor (Edit) - [regress CO 10-18]

File Edit View Data Tools

var16[413]

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581	291	Point	291	.00059	67.923509	25.628763	NO	0	1	0	0	-7.435388	.
582	291	Point	291	.000581	67.923509	25.628763	NO	0	1	0	0	-7.45076	-9.00e-06
583	292	Point	292	.000601	68.487288	25.628763	NO	0	1	0	0	-7.416915	.
584	292	Point	292	.00059	68.487288	25.628763	NO	0	1	0	0	-7.435388	-.000011
585	293	Point	293	.000601	69.051066	25.628763	NO	0	1	0	0	-7.416915	.
586	293	Point	293	.00059	69.051066	25.628763	NO	0	1	0	0	-7.435388	-.000011
587	294	Point	294	.000585	69.614845	25.628763	NO	0	1	0	0	-7.443899	.
588	294	Point	294	.000597	69.614845	25.628763	NO	0	1	0	0	-7.423594	.000012
589	295	Point	295	.000591	70.178623	25.628763	NO	0	1	0	0	-7.433694	.
590	295	Point	295	.000578	70.178623	25.628763	NO	0	1	0	0	-7.455937	-.000013
591	296	Point	296	.00057	70.742402	25.628763	NO	0	1	0	0	-7.469874	.
592	296	Point	296	.000583	70.742402	25.628763	NO	0	1	0	0	-7.447323	.000013
593	297	Point	297	.000574	61.721946	25.064985	NO	0	1	0	0	-7.462881	.
594	297	Point	297	.000583	61.721946	25.064985	NO	0	1	0	0	-7.447323	9.00e-06
595	298	Point	298	.000582	62.285725	25.064985	NO	0	1	0	0	-7.44984	.
596	298	Point	298	.000574	62.285725	25.064985	NO	0	1	0	0	-7.462881	-8.00e-06
597	299	Point	299	.000583	62.849503	25.064985	NO	0	1	0	0	-7.447323	.
598	299	Point	299	.000574	62.849503	25.064985	NO	0	1	0	0	-7.462881	-9.00e-06
599	300	Point	300	.000574	63.413282	25.064985	NO	0	1	0	0	-7.462881	.
600	300	Point	300	.000583	63.413282	25.064985	NO	0	1	0	0	-7.447323	9.00e-06
601	301	Point	301	.000584	63.97706	25.064985	NO	0	1	0	0	-7.44561	.
602	301	Point	301	.000574	63.97706	25.064985	NO	0	1	0	0	-7.462881	-1.00e-05
603	302	Point	302	.000574	64.540838	25.064985	NO	0	1	0	0	-7.462881	.
604	302	Point	302	.000584	64.540838	25.064985	NO	0	1	0	0	-7.44561	1.00e-05
605	303	Point	303	.000573	65.104617	25.064985	NO	0	1	0	0	-7.464625	.
606	303	Point	303	.000584	65.104617	25.064985	NO	0	1	0	0	-7.44561	.000011
607	304	Point	304	.000618	66.795952	25.064985	YES	1	1	0	0	-7.389022	.
608	304	Point	304	.000607	66.795952	25.064985	YES	1	1	0	0	-7.406982	-.000011
609	305	Point	305	.000605	67.359731	25.064985	YES	1	1	0	0	-7.410282	.
610	305	Point	305	.000617	67.359731	25.064985	YES	1	1	0	0	-7.390642	.000012
611	306	Point	306	.000597	67.923509	25.064985	NO	0	1	0	0	-7.423594	.

Variables

Filter variables here

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Shape	Shape *	str5	%9s	
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x	x	double	%10.0g	
y	y	double	%10.0g	
SEZ	SEZ	str3	%9s	
SEZ_1	SEZ_1	byte	%10.0g	
time		float	%9.0g	
post		float	%9.0g	

Variables Snapshots

Properties

Variables
- Name
- Label
- Type
- Format
- Value label
- Notes

Data
- Frame: default
- Filename: regress CO 10-18.dta
- Label
- Notes
- Variables: 13
- Observations: 662
- Size: 37.50K
- Memory: 64M

Ready

Vars: 13 Order: Dataset Obs: 662 Filter: Off Mode: Edit CAP NUM

Data Editor (Edit) - [regress CO 10-18]

File Edit View Data Tools

var16[413]

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614	307	Point	307	.000591	68.487288	25.064985	NO	0	1	0	0	-7.433694	-.000014
615	308	Point	308	.000591	69.051066	25.064985	NO	0	1	0	0	-7.433694	.
616	308	Point	308	.000605	69.051066	25.064985	NO	0	1	0	0	-7.410282	.000014
617	309	Point	309	.000597	69.614845	25.064985	NO	0	1	0	0	-7.423594	.
618	309	Point	309	.000584	69.614845	25.064985	NO	0	1	0	0	-7.44561	-.000013
619	310	Point	310	.000591	70.178623	25.064985	NO	0	1	0	0	-7.433694	.
620	310	Point	310	.000577	70.178623	25.064985	NO	0	1	0	0	-7.457668	-.000014
621	311	Point	311	.000574	70.742402	25.064985	NO	0	1	0	0	-7.462881	.
622	311	Point	311	.000587	70.742402	25.064985	NO	0	1	0	0	-7.440486	.000013
623	312	Point	312	.000577	71.30618	25.064985	NO	0	1	0	0	-7.457668	.
624	312	Point	312	.000591	71.30618	25.064985	NO	0	1	0	0	-7.433694	.000014
625	313	Point	313	.000608	66.795952	24.501206	NO	0	1	0	0	-7.405336	.
626	313	Point	313	.000595	66.795952	24.501206	YES	1	1	0	0	-7.426949	-.000013
627	314	Point	314	.000592	67.359731	24.501206	NO	0	1	0	0	-7.432004	.
628	314	Point	314	.000607	67.359731	24.501206	YES	1	1	0	0	-7.406982	.000015
629	315	Point	315	.0006	67.923509	24.501206	NO	0	1	0	0	-7.418581	.
630	315	Point	315	.000586	67.923509	24.501206	NO	0	1	0	0	-7.442191	-.000014
631	316	Point	316	.000597	68.487288	24.501206	NO	0	1	0	0	-7.423594	.
632	316	Point	316	.000583	68.487288	24.501206	NO	0	1	0	0	-7.447323	-.000014
633	317	Point	317	.000597	69.051066	24.501206	NO	0	1	0	0	-7.423594	.
634	317	Point	317	.000583	69.051066	24.501206	NO	0	1	0	0	-7.447323	-.000014
635	318	Point	318	.000579	69.614845	24.501206	NO	0	1	0	0	-7.454208	.
636	318	Point	318	.000593	69.614845	24.501206	NO	0	1	0	0	-7.430316	.000014
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638	319	Point	319	.000591	70.178623	24.501206	NO	0	1	0	0	-7.433694	.000014
639	320	Point	320	.000579	70.742402	24.501206	NO	0	1	0	0	-7.454208	.
640	320	Point	320	.000592	70.742402	24.501206	NO	0	1	0	0	-7.432004	.000013
641	321	Point	321	.000595	71.30618	24.501206	NO	0	1	0	0	-7.426949	.
642	321	Point	321	.000582	71.30618	24.501206	NO	0	1	0	0	-7.44984	-.000013
643	322	Point	322	.000583	67.359731	23.937428	NO	0	1	0	0	-7.447323	.

Variables

Filter variables here

Name	Label	Type	Format	Value l
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Shape	Shape *	str5	%9s	
pointid	pointid	int	%10.0g	
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x	x	double	%10.0g	
y	y	double	%10.0g	
SEZ	SEZ	str3	%9s	
SEZ_1	SEZ_1	byte	%10.0g	
time		float	%9.0g	
post		float	%9.0g	

Variables Snapshots

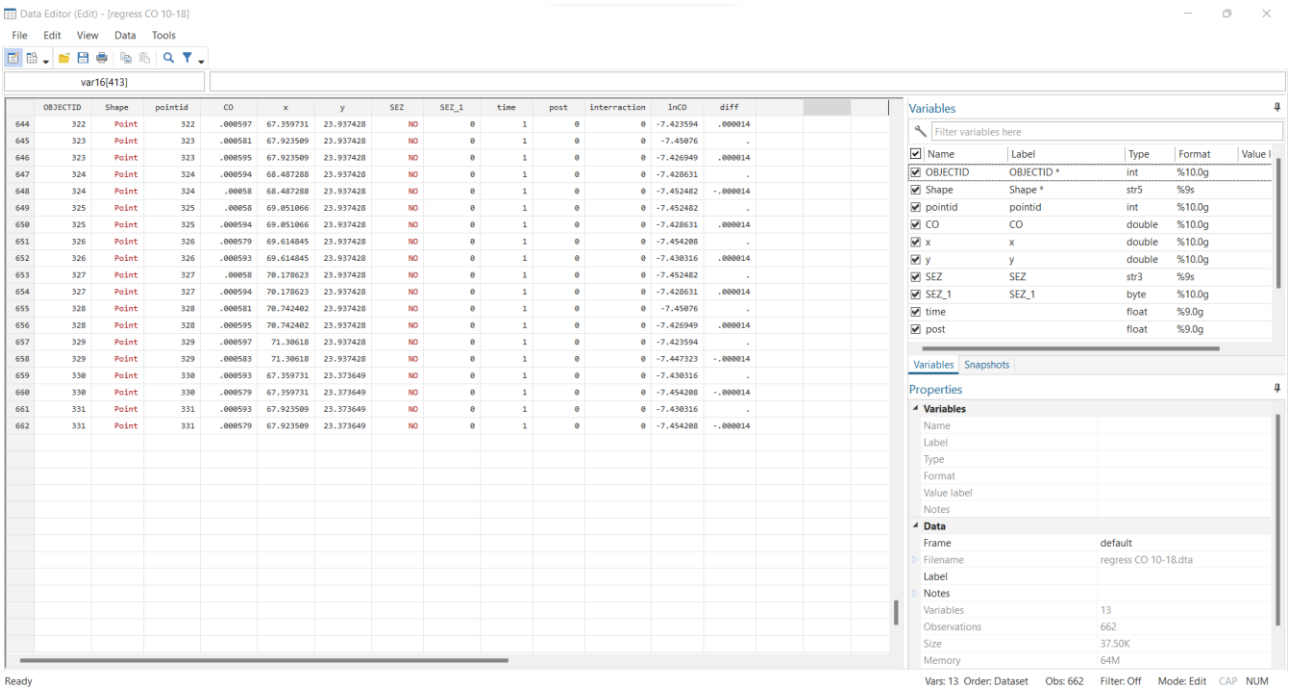
Properties

Variables
- Name
- Label
- Type
- Format
- Value label
- Notes

Data
- Frame: default
- Filename: regress CO 10-18.dta
- Label
- Notes
- Variables: 13
- Observations: 662
- Size: 37.50K
- Memory: 64M

Ready

Vars: 13 Order: Dataset Obs: 662 Filter: Off Mode: Edit CAP NUM



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646	323	Point	323	.000595	67.923509	23.937428	NO	0	1	0	0	-7.426949	.000014
647	324	Point	324	.000594	68.487288	23.937428	NO	0	1	0	0	-7.428631	.
648	324	Point	324	.00058	68.487288	23.937428	NO	0	1	0	0	-7.452482	-.000014
649	325	Point	325	.00058	69.051066	23.937428	NO	0	1	0	0	-7.452482	.
650	325	Point	325	.000594	69.051066	23.937428	NO	0	1	0	0	-7.428631	.000014
651	326	Point	326	.000579	69.614845	23.937428	NO	0	1	0	0	-7.454208	.
652	326	Point	326	.000593	69.614845	23.937428	NO	0	1	0	0	-7.430316	.000014
653	327	Point	327	.00058	70.178623	23.937428	NO	0	1	0	0	-7.452482	.
654	327	Point	327	.000594	70.178623	23.937428	NO	0	1	0	0	-7.428631	.000014
655	328	Point	328	.000581	70.742402	23.937428	NO	0	1	0	0	-7.45076	.
656	328	Point	328	.000595	70.742402	23.937428	NO	0	1	0	0	-7.426949	.000014
657	329	Point	329	.000597	71.30618	23.937428	NO	0	1	0	0	-7.423594	.
658	329	Point	329	.000583	71.30618	23.937428	NO	0	1	0	0	-7.447323	-.000014
659	330	Point	330	.000593	67.359731	23.373649	NO	0	1	0	0	-7.430316	.
660	330	Point	330	.000579	67.359731	23.373649	NO	0	1	0	0	-7.454208	-.000014
661	331	Point	331	.000593	67.923509	23.373649	NO	0	1	0	0	-7.430316	.
662	331	Point	331	.000579	67.923509	23.373649	NO	0	1	0	0	-7.454208	-.000014

References:

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