Investment in Transport Equipment in Greece and the Eurozone

Gregory T. Papanikos
President, ATINER

Invited lecture
University of Maryland, USA
Athens, 21 May 2023

Some Definitions

- Investment is a flow economic variable that replenishes and adds to the stock of capital. The stock of capital is an asset like plants, machineries, cars, airplanes, airports, maritime ports, bridges, rails, inland waterways, highways etc.
- The stock of capital is used to produce intermediate and final goods and services.
- Investment in transport equipment is the amount of money expended to replenish and/or increase the capital stock in industries that produce transport equipment.

Investment and the Production Process

Production Function: $y = f(L, K, Z)$

The total differential is of the form of:

$$dy = (\partial y/\partial L)dL + (\partial y/\partial K)dK + (\partial y/\partial Z)dZ$$

***d*K** is the net change in the capital stock, which by definition is equal to net investment at the firm/industry level.

Total or Gross Investment (I) is equal to net investment (I_n) plus the investment to replace the technologically obsolete or worn-out capital (plant and machinery) (I_d):

$$I = I_n + I_d$$

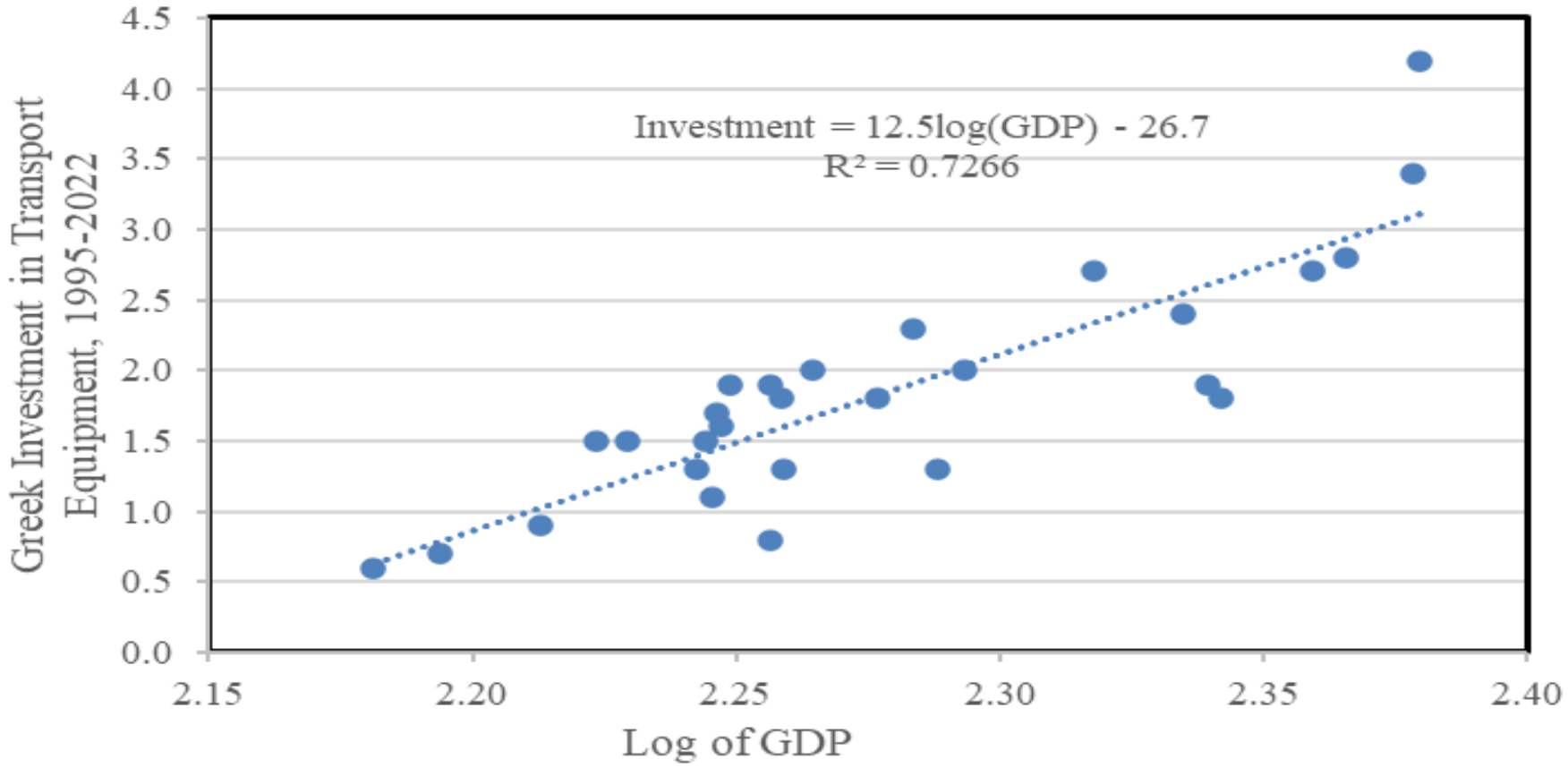
Economic Theories of Investment

- Unlike consumption, the economic theories of investment are not deemed satisfactory and this because of the uncertainty and the risk associated with such decisions about the future.
- Three notable economists/philosophers (Karl Marx, John Maynard Keynes and Joseph Schumpeter) gave metaphysical explanations of investment: drive to accumulate, animal spirits and vision of the future.
- Some basic economic theories of investment are: the present value criterion (the return rate higher than the market rate), the neoclassical approach which makes investment a function of output and prices, and the accelerator principle which makes investment a linear function of the rate of growth of output.

An Example: The Accelerator theory of investment applied to the Greek investment in transport equipment

The Model

$K_t = \alpha Y_t$ and $K_{t-1} = \alpha Y_{t-1}$ => $K_t - K_{t-1} = \alpha(Y_t - Y_{t-1})$ or $I_t = \alpha \Delta Y_t$ and by approximation $I_t = \alpha \log(Y_t)$. The latter is shown in the graph below.



Transport equipment industries where investments can be made

1) manufacture of motor vehicles, trailers and semi-trailers;
2) manufacture of motor vehicles;
3) manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers;
4) manufacture of parts and accessories for motor vehicles and their engines;
5) manufacture of other transport equipment;
6) building and repairing of ships and boats;
7) manufacture of railway and tramway locomotives and rolling stock;
8) manufacture of aircraft and spacecraft;
9) manufacture of motorcycles and bicycles;
10) manufacture of other transport equipment n.e.c. (non elsewhere classified) such as luggage trucks, handcarts, sledges, shopping carts etc.- manufacture of vehicles drawn by animals: sulkies, donkey-carts, hearses etc.

Industrial Policy and Strategy

"Industrial policy" refers to government efforts to shape the economy by **targeting** specific industries, firms, or economic activities. This is achieved through a range of tools such as subsidies, tax incentives, infrastructure development, protective regulations, and research and development support.

Ruchir Agarwal (2023) "Industrial Policy and the Growth Strategy Trilemma", Analytical Series, *Finance and Development*, IMF.

EU's Industrial Policy and Strategy

Investment in clean technologies and disruptive innovation plays a key role in the **European Green Deal** and the new industrial strategy. The industrial strategy addresses the twin challenges of the green and digital transformations.

It highlights the importance of research and innovation in providing the technological foundation to transform and strengthen industrial value chains, helping to turn **sustainability** and digital challenges into business opportunities. Common industrial technology roadmaps are a key tool to achieve this objective.

In order to boost **sustainable investments**, the EU established a **sustainable finance policy** and a dedicated taxonomy regulation, as part of the European Green Deal. These actions aim to attract private green finance to facilitate financing of large-scale demonstrators and deployment.

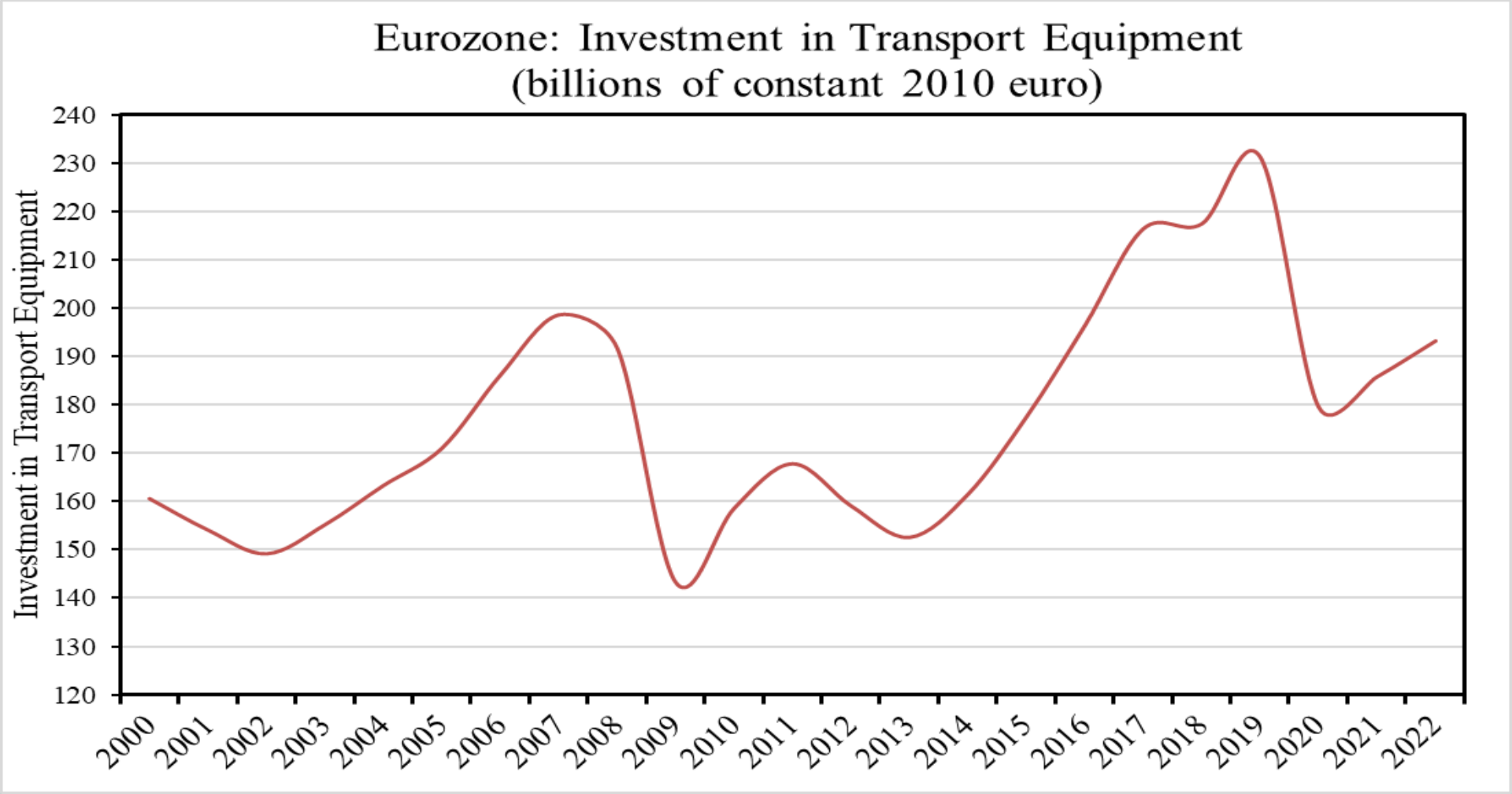
EU's Transport Policy Objectives I

1. Developing a comprehensive strategy for **sustainable and smart** mobility, ensuring a transport sector fit for a clean, digital and modern economy.
2. Promoting **sustainable** and alternative transport fuels for road, maritime and air transport.
3. Working to extend the Emissions Trading System to the maritime sector and reducing free allowances for airlines.
4. Leading in international fora such as negotiating global emissions reductions within the International Civil Aviation Organization and the International Maritime Organization.
5. Contributing to a zero-pollution goal, mitigating the impact of transport on the climate and natural environment from emissions reductions to air, water and noise pollution.
6. Reviewing the Energy Taxation Directive, aligning it with the Commission's climate ambitions and bringing an end to fossil-fuel subsidies.
7. Modernizing transport systems, such as connected and automated mobility, with a strong focus on digital innovation.

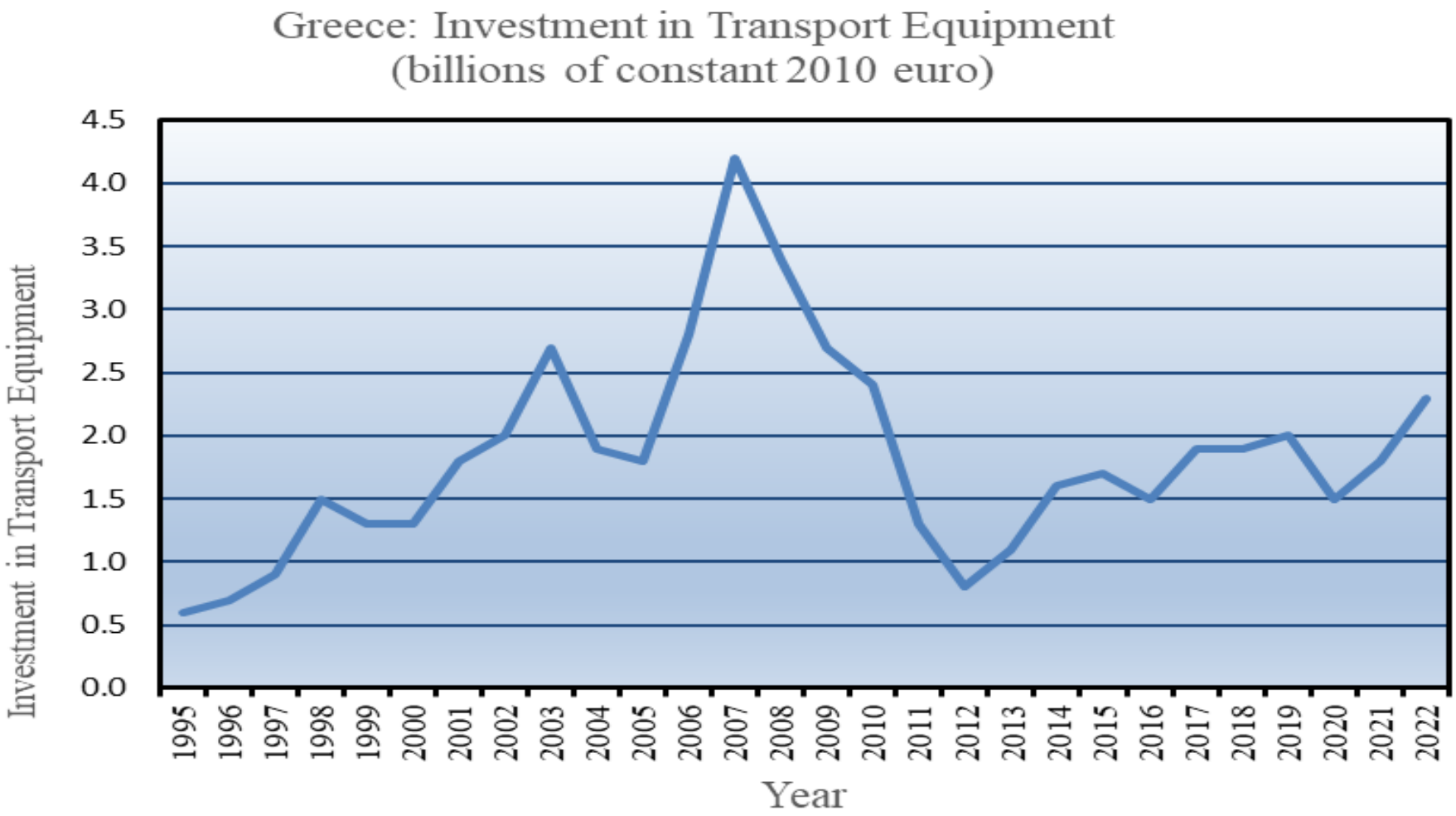
EU’s Transport Policy Objectives II

8. Swiftly completing missing infrastructure links and the Trans-European Transport Network, underpinned by a fair and functioning internal market for transport.
9. Ensuring passenger rights are respected and transport remains affordable, reliable and accessible, particularly for low-income households and those in remote areas.
10. Ensuring the highest safety standards as traffic increases and security threats become more complex.
11. Working closely with key partners to open up new market opportunities and to enforce existing agreements.
12. Improving connectivity links, particularly in the EU's neighborhood and Western Balkans.
13. Ensuring effective implementation of dual-use infrastructure projects to improve military mobility using Connecting Europe Facility funds.
14. Contributing to a **sustainable** and competitive tourism industry.

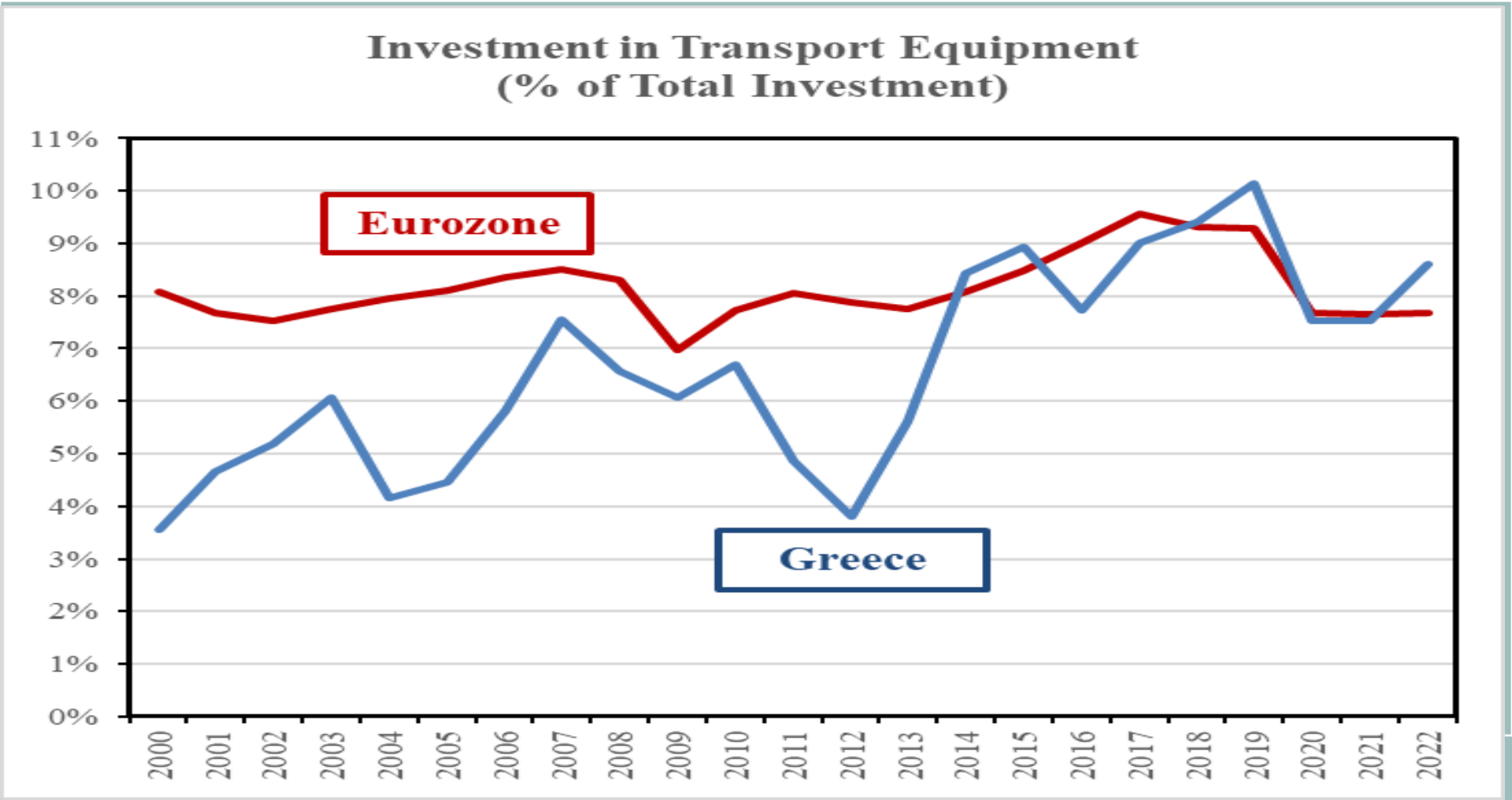
1. In 2022, the eurozone countries spent 193 billions of constant 2010 euro in investment in transport equipment.
2. In 2019 spent a maximum of 231 billion of the entire 2000-2022 period.
3. The minimum value occurred in 2009 of 143 billion.
4. The pandemic of 2020 had a sharp impact on investment in transport equipment measured at 51 billion euro decrease relative to the previous year.



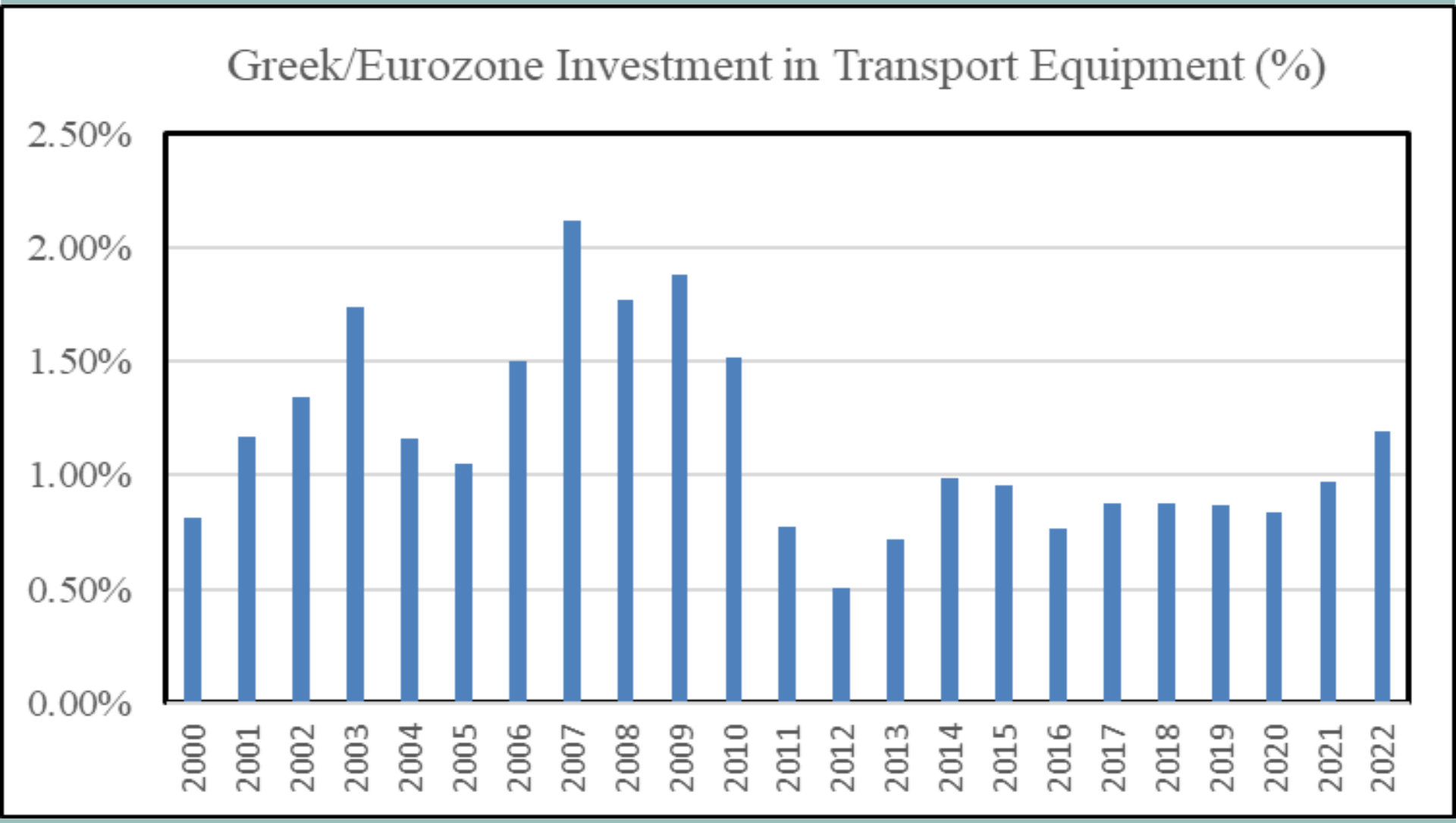
1. Greece's investment in transport equipment was rising since 1995 reaching the first peak of the period just before the Olympic Games of the 2004 of 1.9 billion euro.
2. After a short decrease, it started to increase again reaching the 4.2 billion in 2007.
3. The Great Recession of 2009 hit Greece's transport equipment investment very hard. It reached 0.8 billion euro, the lowest value in the euro years (after 2000).



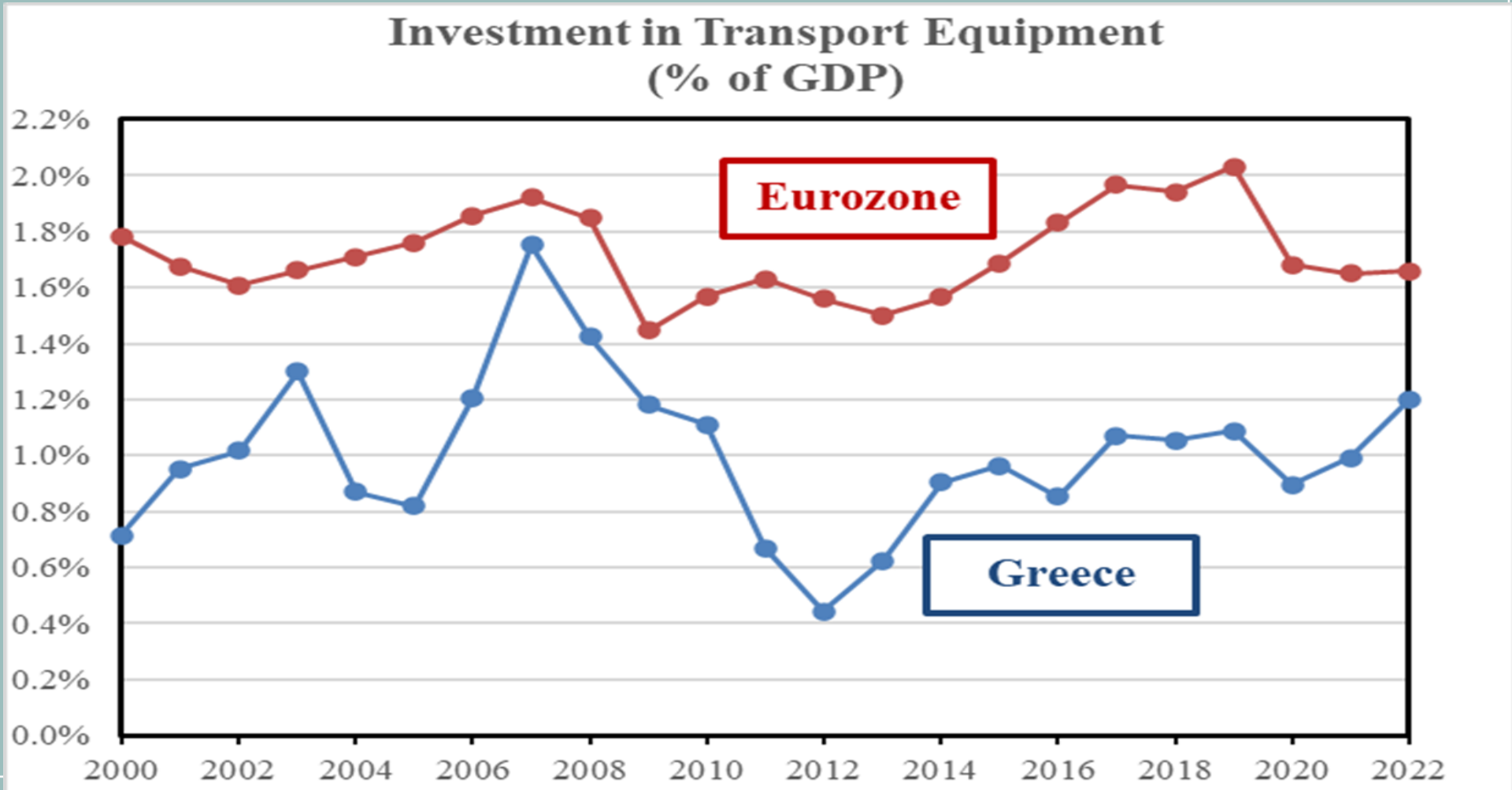
1. Eurozone's transport equipment investment as a percentage of total investment was much higher than Greece's up to 2012. The last ten years the share is almost the same for Greece and the Eurozone.
2. As shown in the Graph, the Great Recession hit harder the transport equipment sector than the effect it had on total investment. From 7.54% in 2007, it dropped to 3.81% in 2012.
3. This was not the case in the Eurozone where the share of transport equipment investment remained relatively stable as a percentage of total investment.

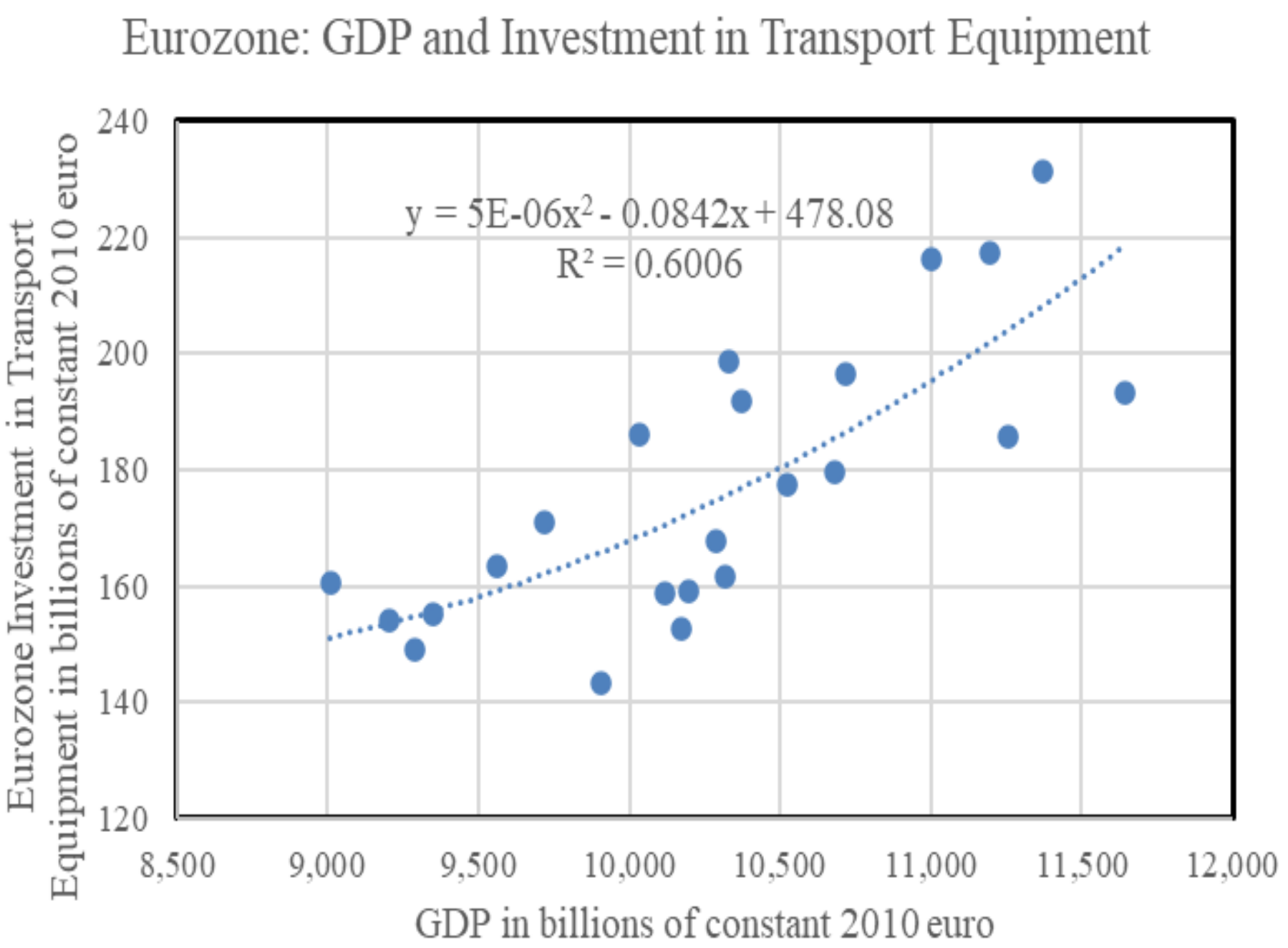


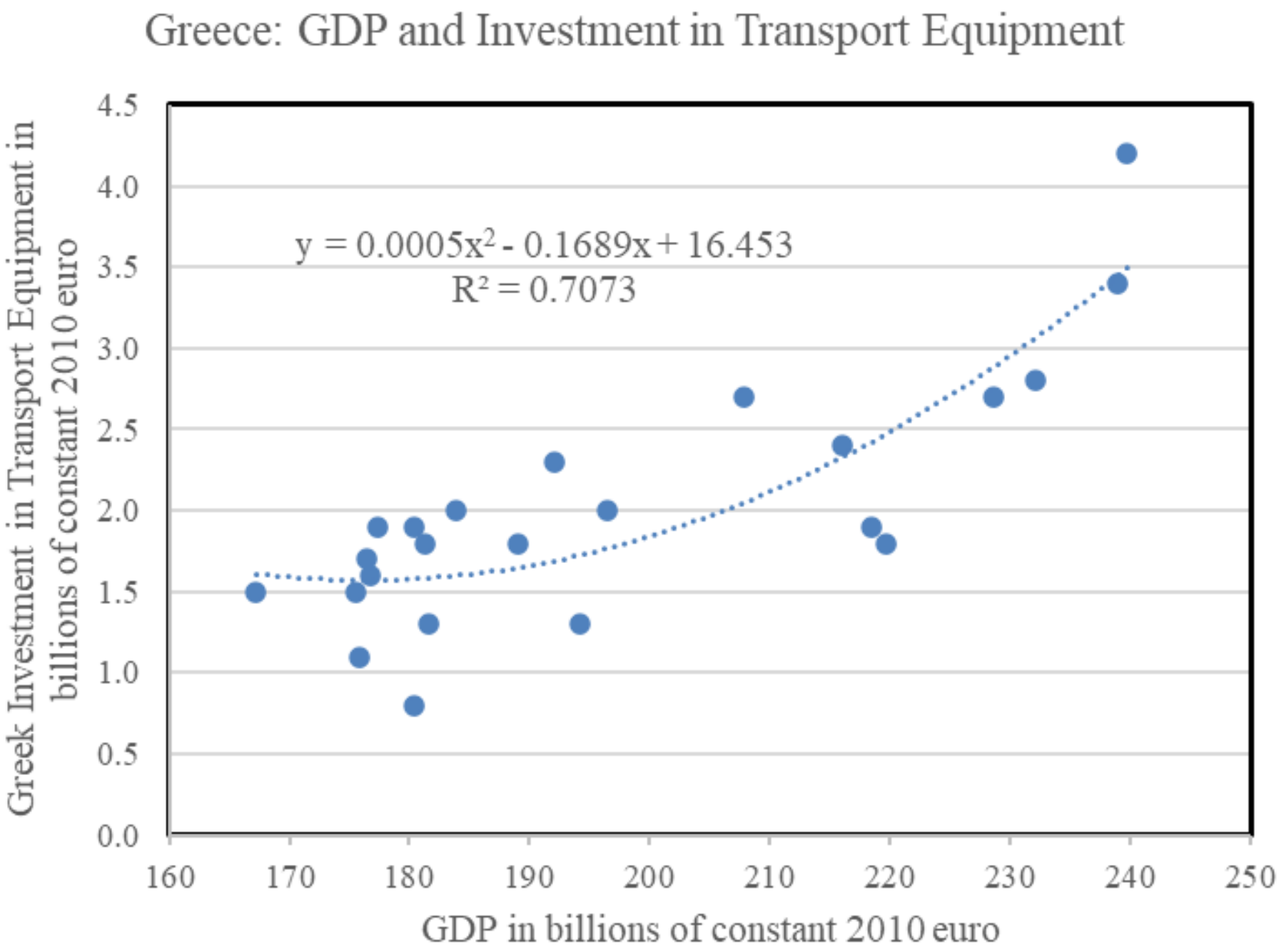
1. Following the previous observations, the share of Greece's transport equipment investment to total Eurozone's transport equipment investment has shown great variability.
2. In 2012 this share was only 0.5%. The average of the period was 1.15% with a maximum of 2.11% in 2007.
3. After the Great Recession, the share remained relatively stable.



1. Greece invests relative less on transport equipment than the Eurozone area.
2. Greece's transport equipment investment is more volatile than Eurozone's. The standard deviation (not reported in the Graph) was 0.28% for Greece and 0.16% for the Eurozone.
3. The Great Recession of 2010 hit Greece's investment very hard. From 1.8% of GDP in 2007 decreased to 0.4% in 2012. The Eurozone percentages were 1.9% and 1.6% respectively.




Eurozone: GDP and Investment in Transport Equipment
y = 5E-06x² - 0.0842x + 478.08
R² = 0.6006
Eurozone Investment in Transport Equipment in billions of constant 2010 euro
240
220
200
180
160
140
120
8,500
9,000
9,500
10,000
10,500
11,000
11,500
12,000
GDP in billions of constant 2010 euro


Greece: GDP and Investment in Transport Equipment
y = 0.0005x² - 0.1689x + 16.453
R² = 0.7073
Greek Investment in Transport Equipment in billions of constant 2010 euro
GDP in billions of constant 2010 euro
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
160
170
180
190
200
210
220
230
240
250

Summary

- Investments replenishes and adds to capital stock.
- The capital stock is used to produce intermediate and final goods and services.
- In the European Union (Eurozone, Greece) the transportation sector (industries) is committed to serve the objective of sustainability by setting certain targes that take into account the climate change and the digital economy.
- The investment in transport equipment is more sensitive to external economic and noneconomic crises such the Great Recession of 2009 and the Pandemic of 2020 than the other sectors of the economy.
- Relative to the Eurozone, the Greek investment in transport equipment has been impacted harder during the Great Recession and the pandemic.
- In both the Eurozone and Greece, there exists a strong positive relation between investment in transport equipment and Gross Domestic Product (GDP)

Thank You!!!