

Effects of Externality on Trade Dynamics and Sustainable Development in the European Economy

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Abstract. This research is concerned with the effects of externality on trade dynamics and sustainable development in the European Union Economy. The focus on trade dynamics as a measure of a country's degree of responsiveness to international trade is critical where relative changes in the socio-economic trend and sustainable growth and development are essential. This paper aims to compare the relative measure of each country's share of trade vis-à-vis the imports and exports to the gross domestic product (GDP) and to also ascertain the level of each country's response to externality concerning sustainable growth and development. 2009 to 2019, representing the period after the 2008 global recession and the covid-19 pandemic were used as the period under consideration. The ratio of trade to GDP was employed in the analysis to ascertain the level of trade in the European Union market. The findings showed that the relative comparison of the level of trade to the GDP in the European countries responded positively as an indicative measure of externality in assessing the sustainable economic development between countries in the European economy. This research is a significant contribution geared towards improving the economic realities of sustainability, leading to enhanced productivity within the context of international trade and externality in the European economy.

Keywords: Trade dynamics, Sustainable Development, Externality.

JEL Classification: *F10, Q01, H23*

1 Introduction

The objective of this paper is to assess trade dynamics as a function of socio-economic reality on sustainable development, relative to externality within the European countries. This would ascertain the statistics of trade merchandise in the European Union vis-à-vis its imports and exports from 2009 to 2019. The author would be employing the World Economic Outlook database and the Eurostat database as the desired metric for the analysis based on trade imports and exports of the 27 countries in the European Union. It is expected that the available resources of a particular country could stimulate the level of output of the economy considering its GDP, increase in investment, reduced cost, and adequate production of goods and services.

Table 1: Trade exchange across the European Union Countries 2009 – 2019

COUNTRY	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	78.4	78	77.4	76.5	76.6	76.8	76.8	78	77.3	77.6	78
Belgium	70.4	69.1	67.7	67.6	66.4	65	62.8	63.8	64.5	64.6	64.2
Czech Republic	78.1	75	74.7	75.4	76.8	77.4	77.3	78.8	78	76.5	76.1
Denmark	69.9	69.9	70.5	70.3	70.3	69.5	69.5	71.3	69.7	70.1	70.3
Finland	65.1	64.2	61.5	62.8	66.3	68.1	73	73	71.7	70.2	71.4
France	69.5	68.5	67.4	67.1	67.8	68.3	69.1	69.9	69.5	68.5	68
Germany	64.7	63.3	63.5	63.6	64.7	65.5	65.6	66.3	66.3	66.4	66.8
Greece	57.1	55.3	52.6	47.6	48.4	49.9	54.7	57.1	55.3	52.6	53.3
Hungary	68.9	68	69.8	70.7	71.7	75.2	76.6	77.7	76.1	74.6	73.6
Ireland	65.5	65.9	66.4	64.3	67.4	67	66.1	65.5	65.6	63.8	65.6
Italy	57.9	55.2	54.1	53.3	55.4	57.1	58.7	60.8	60.2	58.8	59.4
Latvia	75.5	76.1	77.7	78.2	80	80.4	79.3	80.4	78.6	74.8	77.7
Lithuania	59.1	56.6	56.8	57.6	60.3	65.6	67.7	71.1	70.6	68.9	69.1
Netherlands	49.1	46.9	46.7	45.4	46.3	45.8	45.8	46.9	46	45.6	45.2
Poland	72.7	70.8	70	67.7	69	69.6	70.7	72.4	71.7	70	69
Portugal	78.6	76.4	73.3	71.5	72	74.8	76.5	77.8	76.3	75.9	76.4
Slovakia	75	72.6	73.3	73.6	74.1	76.3	78.6	80.1	80	79.7	80.8
Slovenia	75.3	72.5	72.2	72	70.1	69.1	70	70.9	69.4	67.2	63.3
Spain	62.4	59	56.9	54.2	55.3	57.3	60.7	61.9	59.7	58.8	58.4
Sweden	68	67.1	68.2	67.3	68.9	68.8	70	71.1	71.5	70	70.1

Source: Authors Calculation/ Eurostat Database

International Trade of all total products imports (%) and exports (%) in the EU

The relative share of trade exchange between these economies showed dwindling differences according to the Eurostat database report (Table 1.). These differences are cited first, in comparison to the highest figure as indicated in the Slovak Republic, and second,

in contrast to the lowest figure as showed by the Netherlands in the European Union market. However, this peculiarity in trade differences may not be necessarily due to the prevailing economic realities before the pandemic, it could be further researched to ascertain these economic realities of trade during the pandemic.

Table 2: GDP growth rate in percent change in the European Union 2009 – 2019

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	-3.8	1.8	2.9	0.7	0	0.7	1	2	2.4	2.6	1.4
Belgium	-2	2.9	1.7	0.7	0.5	1.6	2	1.3	1.6	1.8	1.8
Czech Republic	-4.7	2.4	1.8	-0.8	0	2.3	5.4	2.5	5.2	3.2	3
Denmark	-4.9	1.9	1.3	0.2	0.9	1.6	2.3	3.2	2.8	2	2.1
Finland	-8.1	3.2	2.5	-1.4	-0.9	-0.4	0.5	2.8	3.2	1.1	1.3
France	-2.8	1.8	2.2	0.4	0.6	1	1	1	2.4	1.8	1.8
Germany	-5.7	4.2	3.9	0.4	0.4	2.2	1.5	2.2	2.7	1.1	1.1
Greece	-4.3	-5.5	-10.1	-7.1	-2.7	0.7	-0.4	-0.5	1.3	1.6	1.9
Hungary	-6.7	1.1	1.9	-1.4	1.9	4.2	3.8	2.1	4.3	5.4	4.6
Ireland	-5.1	1.8	1.1	-0.1	1.3	8.7	25.2	2	8.9	9	4.9
Italy	-5.3	1.7	0.7	-3	-1.8	0	0.8	1.3	1.7	0.9	0.3
Latvia	-14.3	-4.4	6.5	4.3	2.3	1.1	4	2.4	3.3	4	2
Lithuania	-14.8	1.7	6	3.8	3.6	3.5	2	2.5	4.3	3.9	4.3
Netherlands	-3.7	1.3	1.5	-1	-0.1	1.4	2	2.2	2.9	2.4	2
Poland	2.8	3.7	4.8	1.3	1.1	3.4	4.2	3.1	4.8	5.4	4.7
Portugal	-3.1	1.7	-1.7	-4.1	-0.9	0.8	1.8	2	3.5	2.8	2.7
Slovak Republic	-5.5	5.9	2.8	1.9	0.7	2.6	4.8	2.1	3	3.6	2.5
Slovenia	-7.5	1.3	0.9	-2.6	-1	2.8	2.2	3.2	4.8	4.4	3.3
Spain	-3.8	0.2	-0.8	-3	-1.4	1.4	3.8	3	3	2.3	2.1
Sweden	-4.3	6	3.2	-0.6	1.2	2.7	4.5	2.1	2.6	2	2

*Source: World Economic Outlook Database
International Monetary Fund*

Eurostat database Report

2 IMF: World Economic Outlook Database

The World Economic Outlook database report showed the Real GDP growth rate within the European Union economies in 2009 (Table 2.). The Republic of Ireland had the highest Real GDP growth in percentage change in the European Union, while Italy suffered a setback in GDP without a total recovery from the 2008 crisis.

The underlying socio-economic indicator envisaged from externality in this analysis, may not be unconnected with the effects of externality on trade dynamics, which presumably could impact sustainable development in the European economy. The influence of this analytical trend on externality, whether negative or positive considering the overall cost and benefit is critical to this analysis. The objective of this paper is to analyze the effects of trade externality as a socio-economic indicator and its inherent relationship to sustainable development in the European Union economy from 2009 to 2019. In the next section, the theoretical framework of the research is treated with emphasis on the socio-economic effects of externality. The methodology and hypothesis tested are discussed in section three. The results section reveals the computed figures for countries and products with the likely effects on trade, and the economies in terms of the economic growth and development in the European Union.

2 Theoretical framework and review of literature

The socioeconomic implication of trade on externalities has been a controversial subject transcending the years of research with diverse recommendations surrounding both negative and positive externalities. The perceived implication had not necessarily created an all-inclusive report that could determine a standard approach to its computation. The reason is that externality has become a subject of controversial debate over the years with diverse intuitions and professional speculations emanating from economic researchers concerning the costs and benefits. Although the concept of the reality of externality has been generally accepted, however, it had remained ambiguous irrespective of the in-depth study. This in-depth study of externality is not limited to economics in particular as viewed by notable scholars: Zhang (2016) in the banking sector, Zhou (2014) from the insurance perspective, and Lui (2014) in the Coal mining sector. William (2005), argued that “when the choices of economic agents indirectly impose a cost upon others, equilibrium behavior is inefficient”. This is a likely insinuation of some schools of thought who saw externalities from the perspective that its indulgence could lead to market failure, as price equilibrium does not truly reflect the real cost and benefit of a product or service (Adigwe, 2022, p. 7). The conceptualization of externality in economics is a fundamental indication of the cost and benefit indirectly associated with a third party that is not involved with the activities initially performed by the original party.

This concept possibly denotes that externalities are majorly attributable to market failure. The emergence of this assertion is not unconnected with the availability of resource allocation where the production or consumption of a certain product or service is not in tandem with the true cost of the product or service in the economy. A negative externality is perceived as the external cost associated with economic activity that affects a third party who is unconnected with the activity. The most widely used sample is in the area of

environmental pollution where it is a cost on those who are primarily external to the production and consumption of the products, causing the pollution. However, some renowned scholars on this subject such as Coarse, Pigou, and Marshall had viewed externality from different perspectives.

According to Jing et al. (2018), the studies on externality by Marshall, Pigou, Coarse, and other renowned scholars have greatly improved the understanding of externality issues and the insinuation that they have provided inconsistent discussions. Jing et al. further remarked that “Marshall’s externality refers to the impact from activities incidence on other economies, with an example of this tragedy on the common man.

Pigou’s perspective on externalities referred to the influence of the payers on society and the natural environment, which includes global warming and intergenerational equity in sustainable development theory. On the part of Coarse’s externality, he advocates the influence of the players on direct participants, which are likely the effects of the sewage from the factories on fish farms.” Arthur Pigou (1920) originally conceptualized externality where he argued that equality of tax to marginal external cost viewed from the perspective of negative externalities could reduce their incidence effectively. Although, there have been diverse views by economists on the need to tax or rather regulate negative externalities. Various economic groups and agents often characterize externalities through market prices whereby there is an inclusion of both costs and benefits. Although, some economists argue that the best achievable method of guaranteeing this characterization is first; imposing taxes on those engaged with the externality, second: where there is no tax imposed, a minimal point of externality could trigger the imposition of tax automatically.

Kenneth Arrow (1970) further argued that creating a market for an externality is the solution to the issues of externality. However, Frank Knight (1924) thought that government in a differential tariff was used to either provide an incentive to cease negative practices or provide funds for improvement. Meanwhile, Wong (2000) asserted that “externalities imply misallocation of resources, and some corrective policies may have to be taken by the government.” Wong emphasized that action creates an externality where some conditions are satisfied. He emphasized that intervention may not necessarily be the solution to externalities rather, it is better to privatize the market within the facets of the economy. However, externalities have been perceived by environmental analysts in the area of pollution with the emergence of its related cost implication. In his remark, Ha-Joon Chang stressed that “people ‘over-produce’ pollution because they are not paying for the costs of dealing with it”.

³ Adigwe E.O (2022) “A Comparative Analysis of Competitive Trade in a Cluster Market of the EU”, p. 12

⁴. Arrow K. (1970) “Political and Economic Evaluation of Social Effects and Externalities”, pp. 1-30

⁵ JING, W. – SUN B. (2018): “Negative Externalities in the Sharing Economy”, pp. 149-163

⁶ Knight, F.H (1924): “Some Fallacies in the interpretation of Social Cost”, pp. 582-606

According to Mark S. LeClair et al. (2006), “It is argued that products such as timber, minerals, and agricultural produce that produce large negative environmental externalities should be considered: First, where it affects the economic environment that are facing the other agents. Second, where it is fully penalized or compensated for. However, some ecological economists argued against externality since diverse critical reasoning and integration of science are lacking in the concept. They assume that the environmental and community costs and benefits are presumed to likely cancel each other reciprocally. However, the author thinks that trade externality in this regard is directed towards environmental degradation where it is operated, which may likely trigger the need for cost implication. The WTO in its report clearly stated that environmental degradation occurs as a result of the fact that producers and consumers are not penalized to pay for the cost of their actions.

The further emphasis is the view that adequate environmental policies are targeted towards environmental market failures and domestic policies. However, should the targeted policies be put in place, free trade would be the best trade policy. Hence, the fundamental question is: how do we value the effects of trade on a third party (externality)? And is the effects a cost or a benefit? The author assumes that where a cost arises, it is negatively geared but, where a benefit arises, then the effects is presumed to be positively geared towards enhancing sustainable development. However, it is noteworthy that some environmental economists have tried measuring the costs for the valuation of externality using “contingent valuation” techniques, which may not necessarily be useful in terms of their reliability and accuracy for measuring environmental cost.

3 Methodology

The desired metric for the analysis is the World Economic Outlook database on the trade imports and exports of 27 countries that make up the European Union. A method of determining the level of trade was considered from 2009 to 2019 to ascertain if the level of trade associated with externality is positive or negative and its significant effects on sustainable development. The author views the level of trade as the total trade of a country relative to each country’s GDP.

In this study, a predictive statistical model was applied to define the mathematical computation. The study used data collated by the World Economic Outlook database and the Eurostat database report. The focus of the analysis is on the total trade of the 27 countries that make up the European Union and their GDP with a positive LOT index. The data of each country’s trade comprising exports and imports of the market products and services was compared relative to one another to arrive at their LOT. The author used the Level of Trade (LOT) computation to determine the extent of trade externality within the European

Union economy through a mathematical computation formulated for obtaining theoretical results for each of the specific country's economies.

The total trade of the European Union countries from 2009 to 2019 was divided by the gross domestic product (GDP) within the same period to arrive at their level of trade. The objective of the study is to compare the relative level of each country's trade to each country's GDP to ascertain if each country's externality is worthwhile or otherwise. In other words, it is expected to ascertain the aggregate weight of the total trade in the economy. The author's viewpoint of choosing the trade-to-GDP ratio is due to its comparative importance as an economic indicator of the international trade of a country. The Level of trade formula is given as follows:

$$\text{Lotji} = (\text{Jx \%}) / (\text{k})$$

For a secondary data analysis, data collected from the Eurostat and the World Economic Outlook database was used.

The following hypotheses were tested:

H 1: There is a positive level of trade between countries in the European Union indicating socio-economic development from 2009 to 2019.

H 2: Trade externality in the European Union economy is favorable irrespective of the world environmental report on sustainability.

8 Leclair, M.S. – FRANCESCHI, D. (2006): Externalities in International Trade, pp. 462-472

9 PIGOU, A.C (2017) Welfare and Economic Welfare, the Economics of Welfare, pp. 3-22

10 WILLIAM, H.S (2005): Negative Externalities and Evolutionary Implementation, pp. 885-915

11. Wong, K. (2000): Externality in the Theory of International Trade, pp. 2-3

Where Lotji is the Level of Trade of the specific country j's externality x; which is a function of the specific country's trade exchange Jx and the Real GDP (k). A level of trade with worthwhile externality is achieved where Lotji is positive. This invariably means where there is a positive level of trade in the calculation, there is a positive externality and vice versa.

4 Study Results

The computation of the Level of Trade (Lotji) was carried out on 20 countries in the European Union. The data analysis of each country was compared relative to one another to arrive at their Lotji (Table 3.).

H 1: There is a positive level of trade between countries in the European Union indicating socio-economic development from 2009 to 2019. This however confirms the hypothesis.

It is indicative that almost all the 20 computed data on the level of trade externality in the European Union revealed a negative externality except for Poland in 2009 (Table 3.). But, by the end of 2019, all the computed European countries showed a positive trade externality, which indicates a positive level of trade between countries in the European economy translating to socio-economic development within the period under review.

Table 3: Level of Trade Externality of Countries in the European Union 2009 – 2019

Country	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	-20.63	43.33	26.69	109.29	0.00	109.71	76.80	39.00	32.21	29.85	55.71
Belgium	-35.20	23.83	39.82	96.57	132.80	40.63	31.40	49.08	40.31	35.89	35.67
Czech Republic	-16.62	31.25	41.50	-94.25	0.00	33.65	14.31	31.52	15.00	23.91	25.37
Denmark	-14.27	36.79	54.23	351.50	78.11	43.44	30.22	22.28	24.89	35.05	33.48
Finland	-8.04	20.06	24.60	-44.86	-73.67	-170.25	146.00	26.07	22.41	63.82	54.92
France	-24.82	38.06	30.64	167.75	113.00	68.30	69.10	69.90	28.96	38.06	37.78
Germany	-11.35	15.07	16.28	159.00	161.75	29.77	43.73	30.14	24.56	60.36	60.73
Greece	-13.28	-10.05	-5.21	-6.70	-17.93	71.29	-136.75	-114.20	42.54	32.88	28.05
Hungary	-10.28	61.82	36.74	-50.50	37.74	17.90	20.16	37.00	17.70	13.81	16.00
Ireland	-12.84	36.61	60.36	-643.00	51.85	7.70	2.62	32.75	7.37	7.09	13.39
Italy	-10.92	32.47	77.29	-17.77	-30.78	0.00	73.38	46.77	35.41	65.33	198.00
Latvia	-5.28	-17.30	11.95	18.19	34.78	73.09	19.83	33.50	23.82	18.70	38.85
Lithuania	-3.99	33.29	9.47	15.16	16.75	18.74	33.85	28.44	16.42	17.67	16.07
Netherlands	-13.27	36.08	31.13	-45.40	-463.00	32.71	22.90	21.32	15.86	19.00	22.60
Poland	25.96	19.14	14.58	52.08	62.73	20.47	16.83	23.35	14.94	12.96	14.68
Portugal	-25.35	44.94	-43.12	-17.44	-80.00	93.50	42.50	38.90	21.80	27.11	28.30
Slovak Republic	-13.64	12.31	26.18	38.74	105.86	29.35	16.38	38.14	26.67	22.14	32.32
Slovenia	-10.04	55.77	80.22	-27.69	-70.10	24.68	31.82	22.16	14.46	15.27	19.18
Spain	-16.42	295.00	-71.13	-18.07	-39.50	40.93	15.97	20.63	19.90	25.57	27.81
Sweden	-15.81	11.18	21.31	-112.17	57.42	25.48	15.56	33.86	27.50	35.00	35.05

*Source: Author's Calculation/ World Economic Outlook Database
International Monetary Fund*

Irrespective of the author's presumption that the share of trade exchange in the European Union formed an integral part of this analysis, it is instructive that Greece showed a negative externality from 2009 to 2019 except the year 2014. Austria, Belgium, Denmark, France, Germany, Lithuania, Poland, and Slovakia were among the countries with positive externality in line with the author's calculation. The author assumes that the negative report indicated in 2009 was a result of the fallout of the 2008 global recession whose spillover negatively affected global economies.

The data for the other 7 European countries was not available at the time of this computation. However, since the result showed about 74 percent of the research analysis, the H 1 hypothesis is validated.

H 2: Trade externality in the European Union economy is favorable irrespective of the world environmental report on sustainability

This analysis validates that the level of trade externality in the European economy is worthwhile since it indicates a positive externality given the above statistics (Table 3.). The Lotji proves H 2 to be true.

This invariably means that trade externality is beneficial since the hazardous contingencies must have been compensated for, where cost implication is critical and health hazards are considered in the European economy. However, the environmental health implication and the extent of the hazardous contingencies are not within the scope of this paper.

5 Discussion

Several researchers who are environmentalists saw the need for environmental assessment, cataloged as a suggestion to mitigate negative effects and maximize positive ones. These researchers suggested the use of Environmental Impact Assessment (EIA). In his report, Kominkova (2016) explained that EIA was developed as a tool to minimize the negative effects of human activities on the environment. El-Haggar et al. (2003) concluded that solutions to any given environmental pollution problem should be developed, analyzed, and compared through environmental effects and economic assessments.

The term 'externality' in economics is a major concern directed to the effects it reflects on others, which could either be a benefit or a cost, invariably estimated to be external to the market economy. A negative externality is regarded as an indirect cost to an entity. Since air pollution is detrimental to human health, it is adduced a negative externality, especially where the current campaign on sustainability is on market trade. In addition, a positive externality is perceived as an indirect benefit to an entity. Although, while many research scholars view positive externalities as a benefit, it is argued that they signify market failures

since the likely production of good and services are not optimized in the market. This is due to the assumption that the goods and services are not distributed efficiently.

6 Conclusion

Externalities tend to arise when there is a comparable competitive equilibrium between its socio-economic effects on the market. The socio-economic effects is however a consideration of the direct factors that necessitated it. The author assumes that the level of trade externality in the European market is a function of each country's inherent disposition to trade. In the author's opinion, where there is a provision for compensation irrespective of the cost imposed due to externality, then trade externality is beneficial. However, the computation of trade externality is a function of the relationship existing between the country's export and the value of the GDP.

The results showed that trade dynamics have positively geared sustainable development in the European economy irrespective of the existence of trade externality. This, however, suggests that the effects of externality is insignificant in the analytical computation since there is no scientific valuation of determining the costs of environmental degradation, which is a part of the externality. However, some other factors not mentioned in this paper could as well affect sustainable development in the European Union. These factors are relevant for further future research. Remarkably, sustainable development in the European Union economy has three interlinked and equal dimensional areas of concern that could be associated with factors inherent to sustainable development, which are economic, social, and environmental factors. Meanwhile, there is a lingering perception that "it is not possible to achieve a desired level of ecological or social or economic sustainability (separately) without achieving at least a basic level of all three forms of sustainability, simultaneously."

It is indicative that this is one of the European Union's fundamental objectives. According to the special report by the European Union Commission's political strategy center, another factor that could affect sustainable development is the "global existential challenge", which urgently requires a common EU policy response. This is arguably one of the economic factors that impact sustainable development within the European Union economy.

The fundamental aspect of the social factor on sustainable development in the European Union is where social justice gives prominence and credibility to social rights, equality, and human dignity. Meanwhile, it is argued that where social and economic performance is concerned, there remains a huge task of determining whether the present level of welfare condition could be sustained for future generations. However, there are calls for concerns about climate change and sustainability, where environmental and climatic events need urgent intervention in the wake of time. According to the recent standard Euro barometer survey where environmental factors need to be emphasized, some proactive steps are already been carried out to mitigate the effects of climatic conditions necessitated by

environmental factors. Some countries in the European Union like Spain, Italy, and Latvia have already taken a leading position in ensuring a sustainable transformation in response to extreme climatic events. The Austrian government has equally commenced a Klimabonus for all Austrian residents since October 2022, meant to cushion the effects of climatic change due to CO2 emission on its citizens.

The study of sustainability is a significant contribution considering the negative effects of 'greenhouse gases' and carbons emitted during the production process, which had necessitated climate changes and diverse environmental issues. However, in arriving at the author's calculation, the costs associated with externality, and its consequential effects are not reported as part of the cost of production or associated with the market prices of goods and services. This is evidently beyond the scope of this paper, and a basis for further research on the study of externality and sustainability.

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