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OFFICE: Poznań University of Economics and Business
Department of Business Activity and Economic Policy
al. Niepodległości 10, 61-875 Poznań, Poland
phone +48 61 856 95 56, www.ref.ue.poznan.pl, ref@ue.poznan.pl

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ul. Powstańców Wielkopolskich 16, 61-895 Poznań, Poland
phone +48 61 854 31 54, +48 61 854 31 55
www.wydawnictwo.ue.poznan.pl, wydawnictwo@ue.poznan.pl
Postal address: al. Niepodległości 10, 61-875 Poznań, Poland

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Preface

Dear Readers,

We are pleased to present the latest issue of the *Research Papers in Economics and Finance* published by the Poznań University of Economics and Business Press. We have invested a lot of work to ensure that the papers we present to you add significant value to the scientific discussion. We hope that the studies presented together with their results will meet your expectations.

The issue opens with an empirical paper entitled **Reforms to the Israeli income tax**, written by Beny Tzarfati, on assessing income tax changes in Israel over the last decade. The author shows that the major directions of the reforms include the transfer from a territorial basis for taxation of income derived or accrued in Israel only to a personal basis for taxation of the income of residents of Israel, regardless of the place of producing income, expansion of the tax base and reduction of income tax exemptions. Despite the success of the tax reforms, there are still topics for public discussion such as tax evasion, Israel's competitiveness and consistent income tax policy. Besides, the Israel tax authority must take into account the impact on the socio-economic system and act reasonably and transparently, so that citizens understand that the tax burden is fair.

The second paper entitled **Environsental, Social and Governance Responsibility, financial performance and assets: A study of Exchange Traded Funds** was written by Gerasimos G. Rompotis. The author carried out research based on the sample of 168 passive Exchange Traded Funds (ETFs), demonstrating that a high Environmental, Social and Governance (ESG) rating does not induce investors to invest more capital in ETFs. The author has not confirmed the relationship that the higher the ESG rating of an Exchange Traded Fund, the higher its return should be. According to the author, the performance of Exchange Traded Funds is largely determined by the return of indices. To a lesser extent, the performance of ETFs is negatively affected by the expense ratio.

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The third paper entitled **Economic openness, institutional quality and per capita income: Evidence from the Economic Community of West African States (ECOWAS)** was written by Innocent Chile Nzeh, Hycenth Oguejiofoalu Richard Ogwuru, David Ogomegbunam Okolie and Jonathan Ibekwe Okolie. The authors address a very important issue of the impact of institutional quality and economic openness on growth in the Economic Community of West African States (ECOWAS). Based on an ARDL test, the authors demonstrate that in the short term, regulatory quality and outflows of Foreign Direct Investment (FDI) negatively affect the economic performance of ECOWAS countries. In the long run, trade openness, political stability and outflows of Foreign Direct Investment negatively affect the economy of ECOWAS countries, while the quality of regulation affects it positively. The authors believe that ECOWAS countries should introduce an effective regulatory framework in the short and medium term to attract FDI inflows, while in the long term they should build a strong and stable policy environment.

The fourth paper entitled **Application of the vector-autoregression VAR model in the analysis of unemployment hysteresis in the context of Okun's Law** was written by Patryk Kołbyko. The author verifies the occurring phenomenon of hysteresis in the labour market in Poland and the relationship resulting from the macroeconomic Okun's Law. The study confirmed the usefulness of the trend-adjusted VAR model in forecasting the unemployment rate for the Polish economy. The analysis provides important guidance for other researchers conducting studies of economic fluctuations or for policy mix practitioners, to use time series models as much as possible on the methodology of the field of positive economics characteristic of empiricism and economic operationalism, instead of long-run macroeconometric models based on estimation under the assumption of stationary Walrasian equilibrium.

The fifth paper entitled **Third time lucky: An analysis of Paris' bids for the Olympic Games in 2008, 2012 and 2024** was written by Julia Jastrząbek. In a very original way, the author has analysed Paris' three bids to host the Olympic Games in 2008, 2012 and 2024. Only the last bid was successful. The author analyses the trajectory of changes in the bids made by Paris to host this global sporting event. The author argues that there are some fixed elements of the bid, such as heritage and sustainability. There is a consistent effort by the Paris authorities to use the Olympic Games as a tool for urban regeneration and sports development.

The final paper entitled **Limiting meat consumption in the view of students of the Poznań University of Economics and Business** was written by Marceli Hązła and Kamila Michowska. The authors used a questionnaire survey to explore students' attitudes towards reducing meat consumption, in the context of global trends related to sustainability. The authors identified two main areas of analysis, i.e. the impact of excessive meat production and consumption on human health and on the environment. The survey included 296 respondents. According to the

results, more than half of the respondents—predominantly women—limit their meat consumption. The key determinants of limiting meat consumption are environmental concerns and the desire to improve one's health and well-being. One in three respondents will not change their eating habits regardless of the arguments.

Piotr Lis
Editor-in-Chief

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Reforms to the Israeli income tax

Beny Tzarfati[1]

Abstract

Income tax is a major component of state revenues, earmarked to finance the services provided by the government. Income taxes have a significant impact, among other things, on economic growth and income distribution. According to economic theory, personal income tax—perceived as progressive tax—is the main policy tool of the governments of developed countries and is aimed at reducing inequality in income distribution. The Israeli income tax has been through major reforms in the last decade and a half. These reforms include a reduction in income tax exemptions, steadily decreasing tax rates, simplification of tax calculation rules, re-allocation of resources from the public and revenue sharing by reducing the income tax burden on the middle classes, a transfer from territorially based taxation of income earned or accrued in Israel to personally based taxation of income of Israeli residents, regardless of the place of earning the income. The result of changing the tax system and the transition to taxation on a personal basis means, in practice, an expansion of the tax base in Israel. This paper aims to describe the income tax prior to the reforms and the major reforms that had taken place up to 2017.

Article received 4 August 2022, accepted 6 December 2022.

Keywords

- income tax
- reforms
- tax base
- tax rate
- credit points
- Income Tax Ordinance

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[1] Independent researcher, Israel, benytz@gmail.com

Introduction

The aim of this paper is to introduce the major reforms that have been made in the Israeli income tax since 2003, and the directions of the reforms. Most of the reforms were in the 2000s and were intended to fulfill the following objectives: to expand the tax base, to reduce income tax exemptions, to steadily decrease tax rates, to simplify tax calculation rules, to re-allocate resources from the public and share revenue by reducing the income tax burden on the middle classes.

The first section of the article describes the income tax prior to the reforms. The second part is devoted to the reforms introduced, mainly the major reform of 2003, and the third chapter is devoted to the income tax today and its challenges for the future.

The methodology of the paper is to present the reforms on a time scale, without analysing the direction of the reforms, and to group the reforms according to their major objectives, and through that to analyse the direction of changes and their socio-economic influence. This method of presentation enables the reader to better understand the Israeli income tax and the reforms that have taken place. The article ends with conclusions and predictions about future reforms.

1. The income tax up to 2003

Until 2003, there were two separate tax divisions: the Income Tax and Land Taxation Department and the Customs and Value Added Tax (VAT) Division. Following the government's decision of September 2003 to consolidate the management of the collection of taxes under one head administrator and to authorise them by law to activate the relevant tax laws, the two tax divisions were consolidated, and the Israel Tax Authority was established. The Authority is responsible for the collection of direct and indirect taxes in Israel and operates by virtue of laws, regulations and directives. The Authority is also involved in the planning of taxation policy and in initiating various tax reforms. The income tax up to 2003 was based on three pillars: a) territorial base, b) high income tax, particularly for the middle classes, c) relatively narrow tax base.

The first pillar (up to 31.12.2002)—income tax in Israel was territorially based, so only income generated in Israel was taxable, with a few exceptions. Income derived by Israeli residents overseas was not taxed in Israel. The second pillar was high income tax, particularly for the middle classes. As a result, high tax rates on income had serious negative effects, as they reduced the desire to work, harmed

growth, increased the incentive to avoid paying taxes, reduced the amount of disposable income that remained after paying the tax and harmed the well-being of the taxpayer and their family. The third pillar involved a relatively narrow tax base, with a scope of extensive exemptions harming state revenues.

1.1. The first pillar: territorial method

The Income Tax Ordinance adopted the principle of the territorial connection between the source of income and the state of Israel as a basis for tax liability (Income Tax Ordinance [new version] 5721–1961). According to this principle, tax was not imposed on income derived in Israel, whether by a resident of Israel or by a foreign resident. As a result, certain income of Israelis abroad was not taxed in Israel, the most salient examples of which was passive income from dividends paid by foreign resident companies to Israeli residents abroad, and there was no tax charge for personal income generated abroad (Ministry of Finance Tax Reform Committee, 2002).

Residents of Israel whose investments were abroad (rent, interest, royalties, dividends) were not liable for tax on their income as long as their first receipt was not in Israel. The tax discrimination between income from investments in Israel and income from investments abroad created an artificial preference for the latter (Ministry of Finance Report of the Public Committee for Income Tax Reform, 2000).

1.2. The second pillar: high income tax, particularly on the middle classes

Tax brackets are determined by the Knesset and the Income Tax Ordinance. When determining the bracket, the socio-economic situation and the impact of change on the state budget are taken into account. The levels of the tax brackets (and other amounts set by the Income Tax Ordinance) are updated at the beginning of each year according to changes in the Consumer Price Index (CPI) over the past year.

High income earners who earn over 18,841 new Israeli shekels (NIS) a month are subject to a direct marginal tax of 50%, which is not higher than the rate in many OECD countries. On the other hand, the marginal tax rates applying in Israel to the middle classes are very high compared to those in other countries. At a monthly income level above 3,950 NIS, the marginal income tax rate reaches 30%, and it rises to about 45% at an income level above 10,401 NIS (Table 1).

Table 1. Israeli tax rates before the reform of 2002—tax brackets applicable to income from personal exertion

Annual income level (NIS)	Monthly income level (NIS)	Rate (%)
0–23,640	0–1,970	10
23,641–47,400	1,971–3,950	20
47,401–124,800	3,950–10,400	30
124,801–226,080	10,401–18,840	45
Above 226,081	Above 18,841	50

Source: based on data from Ministry of Finance Committee of Experts on Income Tax Reform for Individuals Sheshinski Committee (1988).

There is a striking gap between taxation on labour income and the tax exemptions on most of the profits from interest and income from the capital market, in which the top decile holds a significant share. The high tax burden on income from labour is a result, among other things, of tax exemptions for most financial income. The high rate of income tax on labour income is liable to impair the full extent of the workers' skills and makes it difficult for the Israeli economy to enter the global competition. A high income tax rate at high income levels creates an incentive to invest in tax planning aimed at reducing tax payments in productive activities.

For these reasons, raising the marginal tax rate on labour income above 50% could cause economic damage without significantly increasing tax revenues. At the same time, it is clear that there is no possibility of charging low wage earners with a high tax rate. These considerations, along with the wide scope of the exemptions, imposed a high tax burden on labour income and created a distorted tax structure, which already burdens middle wage earners.

Increases in wages are accompanied by relatively rapid rises in marginal tax rates. Reducing the tax burden on the middle classes is a change that will contribute to greater fairness in the tax system, stimulate and reward work, help economic growth, have broad implications for the tax system as well as the economic reality in the State of Israel and the quality of life of the country's citizens.

1.3. Third pillar: relatively narrow tax base

The scope of extensive exemptions that reduce the state's income indirectly contributes to increases in tax rates on personal income. Most of the capital is concentrated in the hands of high-income earners, and they are the ones who benefit mainly from the large volume of exemptions on capital income and non-taxation of income from abroad, which increases the gap in the effective tax burden borne by the middle-income brackets. The damage is especially severe in areas

where human capital mobility is high, e.g. high-tech. Human capital is the most important resource of the state of Israel, and it would be a mistake if Israel's ability to preserve its human capital is impaired as a result of the poor structure of the tax system.

Tax rates on low income earners in Israel are relatively low by international standards due to the extensive system of credits and deductions that result in more than 40% of individual Israeli taxpayers not exceeding the income tax threshold. The high tax burden on income from work created an incentive for tax sectors to obtain tax breaks. The relative ease of granting tax benefits led to the expansion of the list of tax benefits. This situation required a work plan that would lead to accepted taxation principles, such as the desire for uniformity and neutrality in the income tax, in order to prevent distortions in the allocation of resources, prevent tax planning where fiscal harm is severe and simplify the operation of the tax system to the greatest extent possible. If targeted deductions, credits and exclusions are avoided, substantial revenues can be raised with low tax rates (Henchman, 2012).

2. Reforms to the income tax between 2003 and 2017

Any tax reform needs to balance a number of competing objectives and trade-offs. The impact of growth oriented tax reforms on revenues, the distribution of income, tax avoidance and evasion, as well as tax compliance and enforcement costs all have to be taken into account. Fiscal federalism considerations, the transitional costs of changing tax systems and complex timing issues also have to be considered (OECD, 2010).

The basic considerations for income tax reform in Israel were social justice, economic efficiency, adjustments to global tax systems, simplification and accessibility of income tax laws, administrative costs and implementation mandates, and a balanced budgetary reform. Since 2003, many reforms have been made to the income tax. The direction of the major reforms was to reduce marginal tax rates especially at medium and high income levels, reduce tax evasion and change the income tax base. Under the reform of 2003, it was decided to move from a territorial basis of taxation—income tax that taxes domestic income but not foreign income—to personally based taxation of the income of Israeli residents, regardless of the place of producing the income. The main aspects of the tax reform include reducing the tax burden on employment income, taxation of foreign income, taxation of the capital market, tax relief for foreign residents and new residents, encouragement of business and technology entrepreneurs, as well as the real estate tax reform (Table 2).

Table 2. Expert committees that led to income tax reforms in Israel

Year	Reform
1975	Ben-Sachar Committee: Expanded tax base: all employee income (except for a limited number of exceptions) taxable. Steadily decreasing tax rates. Tax calculation rules simplified.
February 1988	Ministry of Finance Committee of Experts on Income Tax Reform for Individuals Sheshinski Committee (1988): The spacing of the tax brackets to reduce the tax rate calculated by them. The addition of a credit point, which means reducing the tax burden and raising the tax threshold. Payment of a child allowance on a universal basis (i.e. cancellation of the tax imposed on them). Imposition of tax on real capital gains in the capital market. Imposition of a tax on the employer's contribution to a study fund. Cancellation of certain tax benefits, such as tax exemption for gifts and meals.
May 2000	Ministry of Finance Report of the Public Committee for Income Tax Reform, Ben Bassat Committee (2000): removal of certain exemptions, changes in marginal tax rates and imposition of new taxes. Taxation of income from the capital market, taxation of financial income, capital gains and real estate gains, tax benefits for retirement savings, betterment tax on residential apartments, personal allowances for achieving national and social goals: child allowances, credit for working mothers, tax benefits for the disabled, tax benefits for residents of development areas.
June 2002	Ministry of Finance Tax Reform Committee, Rabinovich Committee (2002): reducing the tax burden on employment income, taxation of foreign income, taxation of the capital market, tax relief for foreign residents and new residents encouraging business and technology entrepreneurs, Real Estate Tax Reform
Jan 2003	Income tax reform
December 2004	Report of the Committee for the Examination of Tax Decisions by the Israel Tax Authority (Ministry of Finance, State Revenue Division, 2004)
June 2005	Report of the Ministry of Finance Report of the Committee on the Multi-Year Tax Plan, Mazza and Kaputa (2005).
2007	Reduced marginal tax rates especially at medium and high incomes
2008	Tax break package for new immigrants and returning residents
January 2014	Separate calculation rules have changed, the family unit may request a separate calculation of earned income, even if the husband's income is dependent on one source of income of the other spouse

Source: the author's own analysis based on the publication of the Ministry of Finance cited in the table and Ministry of Finance, State Revenue Division (2001).

2.1. Reforms to reduce tax rates on income

The major change was in January 1, 2003 when it was decided that most tax reduction would affect middle income brackets. As of January 1, 2008, the marginal

tax rate inclusive of social security on a monthly income of $7,150 amounted to 49%. Up to January 1, 2008, there was a gradual reduction in tax rates. Most economists agree that tax systems should have broad bases and low rates (Henchman, 2012). With this solution in mind, Israel adopted an approach similar to those in many EU member states, which reduced the income tax burden of the most vulnerable members of society (Čok et al., 2012).

2.2. Reforms to the taxation of foreign income

The major changes included: the transition to worldwide taxation, determination of residence, source rules, foreign companies and foreign corporations owned by Israeli residents taxed in Israel, off-setting of foreign losses, foreign tax credits, transfer pricing, tax on Israeli individuals changing their residency.

The reform of the territorial method was to change the tax base from the territorial method to the personal method. The taxation of income earned in Israel by non-residents and the taxation of income earned abroad by Israeli residents requires explanation. The switch to the personal tax base system means that income tax is payable, for each tax year, on the income of an Israeli resident derived or earned in Israel or abroad and on the income of foreign residents derived or earned in Israel from these sources (Income Tax Ordinance [new version], 5721–1961). Foreign residents will be taxed on income earned in Israel.

The main advantages of the personal method: it prevents horizontal discrimination between taxpayers who generate income from sources in Israel and those who generate income from foreign sources, and adjusts to the multi-national activity deriving from the globalisation of the world's economy. In Israel, it facilitates Israel's integration into the global system to prevent double taxation, assuming that taxpayers pay the tax. The disadvantage of the system is that the broadening of the tax base could make it difficult for Israeli residents living abroad to compete with residents of countries that do not tax on a personal basis. Source Rules determine the location of income accrual (income location). The purpose of determining the location of income is to establish in what cases a resident of Israel shall be entitled to a foreign tax credit and in what cases a foreign resident will be charged tax in Israel.

Foreign losses are treated as though they were accrued from a single country and set off against foreign income. Losses from passive activity are distinguished from business and vocation losses. Capital losses from the sale of assets abroad shall be set off first against foreign capital gains. Foreign tax credits shall be granted to Israeli residents only and shall offset Israeli tax levied on the same income, while separating income from different sources. No credits will be given for income

exempt from tax in Israel. Foreign tax credits on income from a certain source will not exceed the amount of tax chargeable in Israel for that source of income. Access to foreign tax can be carried up to 5 years forward.

2.3. Reforms to the capital market

As of January 1, 2003, tax shall be levied on the sale of tradable securities by individuals and companies to whom the Law of Adjustments does not apply. Foreign investors will remain exempt from capital gains tax on the sale of shares traded on the Israeli stock exchange. Tax rates on the sale of securities traded on the Israeli stock exchange shall be 15% upon the sale provided that no financing expenses have been deducted.

Capital gain from the sale of foreign securities traded on foreign exchanges that have been purchased since the beginning of 2007 onwards shall be charged at a tax rate of 15%. The sale of foreign traded securities until the end of 2006 shall be charged at a tax rate of 35%.

Tax is charged at a rate of 15% on interest received by an individual in the following cases: interest on linked bonds issued, interest paid on foreign traded securities (35% for interest paid before that), bank deposits outside Israel—made in institutions operating according to their domestic law. Furthermore, tax is charged at 10% on interest received by an individual if the asset is not linked. All other interest shall be charged at the marginal tax rate and no interest expenses shall be deducted from interest income. Dividends received by individuals are subject to no change in the present law and have a 25% tax rate (35% tax rate previously). Dividends from foreign traded securities—25% tax rates.

2.4. Reforms for foreign residents and new immigrants

There is tax relief for foreign residents, as well as tax exemption for foreign residents in venture capital funds and investments by foreign investors through venture capital funds in accordance with prior approval. There is also exemption from capital gains tax on the sale of shares in a qualifying research and development company and the sale of tradable securities. Tax relief for new immigrants (“Olim”) applies to an individual who was not a resident of Israel and has become one.

There is reduction in tax on pensions received by new immigrants to Israel, on account of employment or work in a foreign country. The tax rate shall not exceed the tax that would have been paid on that same pension if the immigrant

had remained a resident of a given country. The relief is not limited to any maximum periods, and is also granted to those who came to Israel before the amendment to the tax law.

There is a 5 year tax exemption rule on passive income—interest, dividends, allowances, royalties and rental income—accrued from assets outside of Israel that were owned before becoming a resident. This relief is extended by transitory provisions. Returning residents are entitled to relief on passive income, provided the bearing assets were purchased abroad after they ceased to be residents of Israel. This relief is extended by transitory provisions. Income from a business owned by a new immigrant during the 5 years before he became resident of Israel is exempt from tax for 4 years after the change of residence, and this relief applies whether or not the new resident continues to participate actively in the business (Israel Tax Authority, 2021).

Relief for the capital gains of new immigrants: there is exemption from capital gains tax for assets sold within 10 years of becoming a resident. This applies to assets outside of Israel owned before becoming a resident. Relief for the capital gains of a returning resident: there is exemption from capital gains tax for assets sold within 10 years of becoming a resident. This applies to assets acquired abroad after ceasing to be an Israeli resident. Assets sold after 10 years of becoming a resident shall be entitled to partial relief, calculated according to relative periods (Israel Tax Authority, 2021).

2.5. Reforms to encourage business and technology entrepreneurs

Capital gains tax on the sale of capital assets other than tradable securities shall be reduced to 25% for both individuals and corporations. The reduced tax rate shall apply to all sales occurring after January 1, 2003, on a proportional part of the profit, calculated linearly. Options or shares given to employees shall be considered as income only upon their sale. The issuing company may choose either of the following methods of taxation when issuing the securities: Method A—Revenue Income—the employee is deemed to have received employment income from which the employer may deduct expenses. Method B—Capital Income—the employee is taxed as having received capital gains (25% tax) from which the employer may not deduct expenses (PwC Israel, 2022).

The chargeable income and losses of the company shall be charged in the hands of the shareholders, according to their share of the rights to profits. The exemption for foreign residents in Venture Capital Funds shall be expanded by lowering the criteria. Foreign investors will remain exempt from capital gains tax on the sale of shares traded on the Israeli stock exchange.

2.6. Other changes

In 2008 a tax break package for new immigrants and returning residents (amendment 168 to the Income Tax Ordinance – see: Income Tax Ordinance [new version] 5721–1961) was introduced. The main benefits for new immigrants and returning residents who became citizens are as follows: 10-year exemption from paying tax on foreign-source income, 10-year exemption from declaring foreign source income which is exempted, 10-year exclusion from the definition of an Israeli company resident for a company established abroad and owned by an Oleh or a Senior Returning Resident, an option to be considered as a foreign resident for taxation purposes for one year after arrival, 3.5 years of entitlement to tax credits with options for extension.

The following entities are entitled to the tax benefits: Oleh and Individuals who have returned to Israel after living continuously outside of Israel, returning to Israel not sooner than 10 years after having ceased to be a resident of Israel (Senior Returning Resident). Those people are also entitled to income tax benefits on passive income—10-year exemption on dividends, interest, rent, royalties and pensions generated by assets held overseas. Additionally, 10-year exemption on capital gains from the alienation of assets located abroad. This is extended to assets located abroad acquired after becoming an Israeli resident; 10-year exemption on business income generated by assets held overseas; 10-year exemption on salaries and income from activities of an independent nature, generated abroad. It applies to businesses and occupations acquired or started before or after becoming an Israeli resident. A company established abroad and owned by an Oleh or a Senior Returning Resident, will not be considered as an Israeli company for taxation purposes for a period of 10 years, and thus will be exempt from taxes in Israel during this period on foreign source income.

Tax credits: All Israeli residents are entitled to 2 credit points, as well as 0.25 additional points for a working man and 0.75 points for a working woman, which are not taxed. A working Olim is entitled to additional points on top of that, for a period of three and a half years following their Aliyah. This benefit may be extended whilst carrying out compulsory army service and whilst studying at university or college. For the first 18 months there are 3 additional credit points, for the following 12 months 2 additional credit points, and for the following 12 months 1 additional credit point. Additional reductions are available for parents of young children, working mothers, discharged soldiers and many other categories. The credits along with marginal tax rates contribute to a more equitable distribution of income (Barbetta et al., 2018).

3. The income tax in Israel 2021

The idea behind establishing tax levels is that any increase in the tax rate that a person must pay as their income rises is controlled, so that there is a situation in which the person earning a higher gross salary will also earn a higher net salary. Tax bands in Israel are narrow, and wage and recorded income tax are charged to everyone (Table 3).

Table 3. Israeli tax rates—tax brackets applicable on income from personal exertion for the year 2021

Monthly income level (NIS)	Tax rate (%)
0–6,290	10
6,290–9,030	14
9,030–14,490	20
14,490–20140	31
20,140–41,910	35
Above 41,411	47

Source: the author's own analysis based on data from the Ministry of Finance, Help table for calculation Income tax from salaryand wages (2021).

The tax structure is a very important aspect of in the quality of taxation. It deals with the design of tax policy to achieve desired policy objectives, while at the same time promoting economic growth, minimising distortions and reducing the cost of tax collection (Lee & Gordon, 2005). With tax burdens differentiated by earning levels and family situations, they serve as a central role in redistribution policies (Cordes & Juffras, 2012). In Israel about 54% of employed individuals do not pay income tax at all (Ministry of Finance, State Revenue Division, 2014). This is due to both the lower tax rates for low income earners and credit points to which every citizen is entitled. Between 2000 and 2021 there was an increase in the extent of Israel's progressive income tax, which contributes to reducing inequalities to a relatively large extent. There is no exact formula and definition of the extent to which income tax should be progressive (Szarowská, 2014).

A higher income tax rate on an employee's salary could prevent workers from utilising all their skills and hamper the integration of Israel into the international economy. High tax rates at high income levels create an incentive to invest in tax planning aimed at reducing income tax payments rather than productive activity. According to these considerations, raising marginal tax rates on labour income in excess of 50% can cause economic damage without significantly increasing the collection of income tax. At the same time, we cannot charge high income tax

rates on low incomes. These considerations, together with the wide scope of the exemptions, required a high tax burden on labour income, and the income tax structure created distorted middle income wage levels.

A credit point is an amount that can be deducted from the tax, provided that the credit given to the taxpayer is not an amount exceeding the tax payable by the taxpayer. The value of a credit point for tax in 2017 is 215 NIS per month. The significance of eligibility: income tax from the employee's pay shall be reduced by an amount equal to the product of the number of credits worth credit points. The offset value is annual and includes the month in which the employee did not work. Therefore, an employee who is in mid-year will be entitled to a higher monthly credit than the employee who has worked during the whole year (total annual credit will be the same for both). The amount of credit as an income tax offset applies to an employee in a job. Any employee who is a resident of Israel is entitled to 2.25 credits from the Israel tax authority. In addition, there are various criteria that entitle extra points. The taxpayer who best meets the criteria will gain the greater number of credits. The amount of credit as an income tax offset applies to an employee in a job.

The significance of entitlement is that any income tax on employee pay shall be reduced by an amount equal to the sum of the number of credits worth credit points. Credits reduce the maximum tax value to zero, so they are useful only to the employee. For example, the annual value of 2 credits in 2017 is 5,160 NIS (2,580 NIS is the annual value of one credit point). For workers who are entitled to 2 credits and where the total income tax due is lower than 5160 NIS, they take only the share of credits worth the amount of income tax they must pay (they are not required to pay income tax at all).

The following are the main credit points: credit for the resident of Israel—two credit points shall be taken into account in calculating the tax of an individual who has been a resident of Israel in the tax year, credit for Oleh, credit for commuting to the workplace—in calculating the tax of an individual resident of Israel, 1/4 credit point shall be taken into account as a travel credit, credit for women—in calculating the tax of a woman, 1/2 credit point shall be taken into account, credit for a spouse—in calculating the tax of a beneficiary of an individual resident of Israel, who proved to the Assessing Officer's satisfaction that he supported his spouse during the tax year, one credit point shall be taken into account, credit for a working spouse—if the chargeable income of an individual resident of Israel, who is a registered spouse, includes the income of his spouse; if it is proved to the Assessing Officer's satisfaction that the spouse's income was obtained by personal exertion from any business or vocation or from employment, including income from personal exertion, then in calculating the chargeable income, 1/4 credit point shall be taken into account; 1.5 credit points if they are not entitled to a pension point and 1.75 credit points if they are entitled to an aforesaid pension point; credit for

a spouse—in calculating the tax of an individual resident of Israel whose spouse helps them in obtaining their income from any business or vocation during at least 24 hours in each week during nine months of the tax year, then 1.5 credit points shall be taken into account if they are not entitled to a pension point and 1.75 credit points if they are entitled to an aforementioned pension point, and in respect of a beneficiary individual.

Credit points for those made redundant, pension and credit points for children, a divorced man who has remarried, a juvenile, an individual who completed studies for a bachelor's or master's degree, professional studies, a person who returned to work, a spouse who was married during part of the year, for the expense of maintaining a relative in an institution, for incapacitated persons, insurance premiums and benefit funds (Income Tax Ordinance [new version], 5721–1961).

The income tax threshold is the threshold above which tax is only beginning to be charged on income. This threshold depends on the individual tax credits to which taxpayers are entitled. For example, a man who is entitled to 2.25 credit points began to pay income tax starting at an income of 4,905 NIS a month in 2015. In 2015 there were 52.3% persons under the tax threshold (Table 4).

Table 4. Annual and monthly value of credit point in 2011–2021

Annual value (NIS)	Monthly value (NIS)	Year
2,616	218	2021
2,628	219	2020
2,616	218	2019
2,592	216	2018
2,580	215	2017
2,592	216	2016
2,616	218	2015
2,616	218	2014
2,616	218	2013
2,580	215	2012
2,508	209	2011

Source: the author's own analysis based on data from the Ministry of Finance, various years.

Tax benefits differ from state to state. For example, the United States Congress provides citizens with incentives to save for their own retirement. The two pillars of the private retirement system are the tax-exemption of the pension plan income and income smoothing.The smoothing benefit is a consequence of tax progressivity. By contributing before-tax income during working years, when inframarginal tax rates are high, and withdrawing funds at retirement when they tend to be low, lifetime tax liability is reduced.

Conclusions

Israel's income tax has been through major reforms in the last decade and a half. The major directions of the reforms have been: transfer from a territorial basis for taxation of income derived or accrued in Israel only to a personal basis for taxation of the income of residents of Israel, regardless of the place of producing income; expansion of the tax base; reduction of income tax exemptions; steadily decreasing tax rates; simplification of tax calculation rules; re-allocation of resources from the public; and revenue sharing by reducing the income tax burden on the middle classes.

Although the state of Israel has succeeded in adapting the income tax in Israel to that accepted around the world, in 2017 the system still had many challenges and issues for debate, such as:

1) Tax evasion—in 2012 income tax accounted for approximately 42% of total state tax revenue and it is estimated that the size of the black economy in Israel, according to the World Bank's publication reached 23% of GDP. The Income Tax Ordinance is not exempted from income tax derived from an illegal source. The Tax Authority should act in a comprehensive, efficient and effective manner in order to increase tax collection in this area. The Israel tax authority only criticises a small fraction of taxpayers and this does not have an effective deterrent effect on this behavior and can even create an incentive for those individuals to avoid taxes.
2) Israel's competitiveness—as personal income taxes contribute significantly to the overall tax burden on labour, it is also a relevant factor in international competitiveness (Szarowská, 2013) and the functioning of labour markets or fiscal federalism.
3) A consistent income tax policy, long-term strategic planning and adjustment of income tax changes to government policy from a broad fiscal perspective and the simplicity of the income tax, reducing inequality, boosting economic growth and redistribution of wealth are also challenges and issues for debate. The State of Israel preferred that the tax unit, with tax revenues on personal labour, be calculated according to the individual rather than the family. This is the reason for the progressive nature of the tax system, which in their opinion should be applied to the entire family income. The income tax system must ensure transparency of tax laws, increase the compatibility between tax laws and tax collectors, and increase reporting to citizens. These properties are correlated to the real involvement of taxpayers in the decision-making process. Tax laws that are not clear enough can be abused to hide the real price of imposing taxes on the one hand, and circumventing laws on the other. Thus, for example, the transparency of the income tax in

the case of the minimisation of arbitrariness in the tax system. The simplicity of income tax laws is necessary not only to increase consumer access but also to reduce the costs of tax collection. Tax collection involves costs such as the salaries of income tax officials, time required to fill forms and payment to consultants. Most of these challenges are not unique to Israel.

The author's opinion is that the income tax should be examined in order to minimise the damage it causes to the economic system. However, some damage is necessary to finance government expenditure. In any case, the distortions in this necessary system should be minimised as much as possible. Any reduction in income tax requires the imposition of tax on another factor in the economy, causing damage to growth and tax revenues. Future reforms should be in directions that will allow for successful income tax policy in terms of collection, norms and tax evasion. Future income tax rates should be correlated with the economic and technological reality. It is forbidden to impose a tax that has no proper basis for implementation, such as the taxation of child allowances in the 1980s. Income tax rates should be similar to other countries. Tax policy managers should strive to avoid complicated taxation. An overly complex income tax results in taxes having negative consequences and sometimes it is not clear whether they are legal. In the author's view, simpler income tax laws are preferable to complex income tax laws that try to find solutions to all alternatives and possibilities. Sometimes the judges' inability to reach decisions on tax issues leads the system to reach an arrangement with the taxpayer, which increases the likelihood of tax evasion. The taxpayer assumes that in most cases they will not be caught, and if they are caught, they can always reach an arrangement and pay less tax. The Israel tax authority must take into account the impacts on the socio-economic system and act reasonably and transparently, so that citizens understand that the tax burden is fair.

It is possible that the highest exemption is thus granted to individuals with the lowest income and vice versa (Čok et al., 2012). A reduction of the tax bracket from 7 to 5 and a reduction of the tax rate for the first bracket as well as removal of some tax exemptions and deductions would make the Israeli income tax more equal, transparent and simple.

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Poznań University of Economics and Business

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Environmental, Social and Governance Responsibility, financial performance and assets: A study of Exchange Traded Funds

Gerasimos G. Rompotis[1]

Abstract

Two research questions are examined in this study with a sample of 168 passive Exchange Traded Funds (ETFs). The first one asks whether a high Environmental, Social and Governance Responsibility (ESG) rating induces investors to allocate more money in an ETF. The empirical findings indicate that the level of assets is not affected by the ESG rating whatsoever, but it is affected by factors such as the historical performance, the expense ratio and the age of each fund. The second question raised concerns the relationship between the performance of an ETF and its ESG rating. The hypothesis examined is that the higher the ESG rating of an ETF is, the higher the return of the ETF should be. The results do not confirm this hypothesis. Not surprisingly, to a large extent, the performance of ETFs is driven by the return of the tracking indexes. To a lesser degree, expense ratio bears a negative impact on ETFs' performance.

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Keywords

- Exchange Traded Funds
- Environmental, Social and Governance Responsibility
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[1] National and Kapodistrian University of Athens, Panepistimiou 30, Athina 106 79, Greece, geras3238@yahoo.gr

Introduction

Sustainable long-term investing has gained significant popularity over the recent years with investors taking very seriously the environmental, social and governance aspects (ESG) of their investments. As of September 2021, European sustainable funds held about 3.4 trillion US dollars of assets. The respective amount in the United States was 331 billion dollars, while worldwide, sustainable funds managed about 3.9 trillion dollars (Statista, 2021).

In this paper, we use data of a sample of 168 passively managed iShares during a period covering the inception date of each fund in the sample till 31 December 2020 to address two main research issues surrounding ESG investing. The first issue concerns the general factors that affect the level of assets managed by ETFs. The focus is paid on the relationship between the ESG rating awarded to an ETF and the assets that flow into the fund. The hypothesis examined says that the higher an ETF's ESG rating is, the higher the money flow into the fund should be. The statistical and regression empirical analysis performed does not confirm this assumption. In particular, the results indicate that there is not any significant correlation between the various ESG measures assessed and the assets held by ETFs. Other factors, such as the historical return of a fund, age and expense ratio seem to be some of the explanatory factors of ETFs' assets. Based on our results, investors place more money to seasoned funds with significant historical performance records. On the other hand, expenses deter investors from an ETF.

The second research issue examined regards the relationship between the return of an ETF and its ESG rating. On this matter, the assumption that is examined says that the higher the ESG rating of an ETF is, the higher the demand for this ETF should be and, thus, the higher the financial value or return of the ETF should be too. Trying to answer this question, other factors, such as the tracking index and the fund's age and expense ratio, are assessed as the explanatory variables of ETFs' return.

The empirical results do not confirm any significant correlation between the ESG rating of ETFs and their performance. However, a minor negative relationship between the two variables is found in the case of ESG rating provided by Morningstar. To a high degree, the return of ETFs is driven by the return of their benchmarks. This finding is not surprising, given the passive nature of ETFs in the sample. However, a perfect index return replication is not the case. This fact results in an average underperformance (tracking error) of 25 basis points (bps) over the entire trading history of the examined ETFs. Along with the return of the tracking index, the performance of ETFs is affected by expenses. Not surprisingly, this impact is negative.

Apart from the issues examined above, the relationship between the ESG rating and performance rating is investigated. The assumption that is examined says

that ETFs awarded with high ESG rating, should also be awarded with high return rating. To answer this question, single-factor cross-sectional regressions of ETFs' Morningstar return rating on relevant ESG ratings are applied. The results reveal a weak positive relationship between Morningstar return rating and Morningstar ESG rating.

At the last step, we seek to verify whether there is any trade-off between ESG exposure and tracking error, as well as expense charges, as it is frequently assumed by the investment community. This trade-off means that the higher the exposure to sustainable investments is, the higher the tracking error and the expense ratio of an ETF will be. The empirical results do not confirm such a relationship. On the contrary, some weak evidence is obtained on a negative correlation between Morningstar ESG rating and ETFs' tracking error, which entails that the higher the ESG rating of an ETF is, the lower the tracking error of this fund is too.

This paper contributes to the ESG literature in several ways. To our knowledge, while sustainable investing with mutual funds has drawn significant interest among researchers, this issue is under-researched in the case of ETFs. This inference is very strong when the issues surrounding the relationship between ESG rating and the return of ETFs are concerned. Moreover, the existing literature on ESG investing with ETFs has focused mainly on the risk and return attributes of these funds, their performance versus the performance of non-sustainable ETF peers, and the value of the diversification offered to investors by the ESG ETFs. Issues such as the relationship between ESG rating and assets, ESG rating and return rating, ESG rating and tracking error or expenses have been neglected in the literature. Our paper fulfills this gap by providing significant empirical evidence on these neglected issues.

The rest of the paper is structured as follows: Section 2 discusses some of the key findings of the literature on ESG investing with mutual funds and ETFs. Section 3 presents the research hypotheses and the methodology used in our empirical research, as well as the data and statistics of the sample. The results are presented in Section 4 and the conclusions are discussed in the last section.

1. Literature review

In this section we discuss some of the key findings of the literature on sustainable investing. We focus on stocks, mutual funds and ETFs and examine issues that mainly relate to the performance of these securities.

In an early stage, Hamilton et al. (1993) compare the excess monthly returns of socially responsible (SR) equity mutual funds to the corresponding return of non-SR

mutual funds over the period between 1981–1990. The authors find no statistically significant return differences between the two fund groups. In the same context, Statman (2000) compares the monthly risk-adjusted return of the Domini Social Index (DSI), which is an index of socially responsible companies, to the return of the S&P 500 Index during the period between 1990–1998. He finds that the DSI performed better than the broad US stock market, represented by the S&P 500 Index, during the period under study. Moreover, Statman (2000) compares the returns of socially responsible and conventional mutual funds over the same period, finding that the SR funds performed better than their conventional counterparts. However, this outperformance is not statistically significant. Kreander et al. (2005) provide similar results on 60 European so-called "ethical funds" from the UK, Sweden, Germany and the Netherlands over the period between 1995–2001. Other studies supporting the similarity in performance between SR stock investing and traditional stock investing are those of Goldreyer and Dlitz (1999), Shank et al. (2005), Statman (2006), Renneboog et al. (2011), Cortez et al. (2012), Jacobsen et al. (2019), Niblock et al. (2020), and Plagge and Grim (2020).

Other studies find that sustainable or socially responsible investing can be sufficiently rewarding to investors. In this respect, Kempf and Osthoff (2007) assess a trading strategy of buying stocks with high SR ratings and selling stocks with low SR ratings. The authors conclude that this strategy can result in significant abnormal returns (up to 8.7% annually), even after allowing for transaction costs. In the same spirit, Gil-Bazo et al. (2010) report that over the period between 1997–2005, the SR funds in the US performed better than comparable conventional mutual funds, both in before-fee and after-fee return terms. This outperformance is detected in SR funds that are managed by companies specialised in socially responsible investing. However, this return advantage of SR funds reverts to a disadvantage when SR and traditional mutual funds managed by companies which do not specialise in SR investing are compared. Other studies that conclude that SR investing can be profitable from a financial perspective are those of Derwall et al. (2005), Statman and Glushkov (2009), Edmans (2011), Derwall et al. (2011), Nofsinger and Varma (2014), Chong and Phillips (2016), and Filbeck et al. (2019).

On the other hand, several studies find evidence that applying ESG or other ethical criteria in stock investments comes with a cost. This cost regards a return disadvantage of responsible investing relative to "non-responsible" investing. In this respect, Bauer et al. (2006) report that during the period between 1992–1996 ethical funds in Australia underperformed significantly their conventional peers. However, during 1996–2003, the performance of ethical funds approximated the performance of conventional funds. Renneboog et al. (2008) find that SR funds in the US and the UK, as well as in many continental European and Asia-Pacific countries, underperform their domestic benchmarks by 2.2% to 6.5%. This underperformance is interpreted as the "price" paid by investors for

being ethical. Adler and Kritzman (2008) estimate the cost of SR investing, from a return perspective, by questioning whether imposing restrictions on the available investment universe is the most efficient method for promoting social ideals. The authors compare the return of a skillful investor in an unrestricted and in a restricted investment universe and find that the financial sacrifice, i.e. lost performance, of SR investing is substantial. Other studies concluding that environmental, social and ethical responsibility comes with a high cost in terms of financial performance are those of Girard et al. (2007), Lee et al. (2010), Chang et al. (2012), Muñoz et al. (2014), Capelle-Blancard and Monjon (2014), and Silva and Cortez (2016).

In a slightly different context, Halbritter and Dorfleitner (2015) investigate the ESG marketplace in the US over the period 1991 to 2012. In particular, the authors construct a high and low portfolio of stocks including ESG out- and underperformers. The results of the empirical analysis show that there is no significant difference in returns between companies with high and low ESG ratings. Dolvin et al. (2019) assess Morningstar sustainability ratings of mutual funds against their performance. The main finding of the authors is that the risk-adjusted return of funds with high sustainability scores approximate the corresponding returns of funds without such high scores. Therefore, based on these findings, SR investors can pursue their social or sustainability targets without significant losses in financial performance terms, but also without realising any financial benefits as well. On the same matter, Chang et al. (2020) examine the relationship between sustainability and mutual fund returns by using Morningstar sustainability ratings, star ratings and analyst ratings. The findings of the authors show that the correlation between sustainability and returns is very low. From a practical point of view, the results entail that SR investors do not have to suffer any financial loss when investing with a positive social inclination.

In the case of ETFs, Rompotis (2016) assesses the performance of water ETFs against the performance of the tracking indexes, the S&P 500 Index and the market portfolio built by Fama and French. The findings show that, regardless of the benchmark that is used, the water ETFs cannot offer investors significant above-market returns. On the contrary, in several cases negative and significant alphas are estimated. These negative alphas are comparable to the fees charged by the funds. Marozva (2014) compare the return of ETFs listed in the Johannesburg Stock Exchange to the return of the JSE SRI Index during 2004–2014. The author finds that there are no significant return differences between ETFs and the index during the period of economic growth. However, the JSE SRI Index underperformed significantly the ETFs during the period of economic decline. Rodríguez and Romero (2019) add that the Global SR ETFs provide better international diversification than the traditional ETFs. Finally, Kanuri (2020) examines the risk and return characteristics of the ESG ETFs since February 2005 through July 2019 and compares them

with investable proxies for US and global equity markets. Even though the ESG ETFs outperformed the market indexes in some periods, during the entire period, the indexes outperformed the ESG ETFs.

2. Hypotheses and methodology

In this section we develop the hypotheses that will be investigated and describe the methodology that will be implemented in our study.

2.1. Analysis of assets

The first issue that will be examined concerns the relationship of ETFs' assets with their ESG ratings. The hypothesis made here is that an ETF with a high ESG rating should attract more money than an ETF with a lower ESG rating. This increased money inflow to an ETF should be reflected in a significantly positive correlation between the ESG rating and the assets undermanaged by the fund.

Along with the relationship between ETFs' assets and ESG ratings, we try to detect other features of ETFs that could affect the level of assets managed by them. The factors that are tested are the age of ETFs, the expense ratio, the historical return, the trailing yield over the last 12 months, the star rating of performance awarded by Morningstar, and the carbon intensity of ETFs.

The analysis of assets is applied with the following cross-sectional Model (1):

$$\begin{aligned} Assets = \lambda_0 + \lambda_1 Age + \lambda_2 ExpRat + \lambda_3 Ret + \lambda_4 Yield + \\ + \lambda_5 StarRet + \lambda_6 ESGRate + \lambda_7 Carb + u \end{aligned} \quad (1)$$

where: *Assets* is the natural logarithm of ETFs' assets under management as of 31.12.2020; *Age* is the age of ETFs in years as of 31.12.2020; *ExpRat* is the latest published expense ratio of ETFs; *Ret* is the historical return of ETFs since the inception of each fund through the end of 2020; *Yield* is the percentage trailing yield of ETFs over the last 12 months as of 31.12.2020; *StarRet* is the Morningstar performance star rating as of 31.12.2020; *ESGRate* is the ESG rating of ETFs as of 31.12.2020; *Carb* stands for ETFs' carbon intensity as of 31.12.2020.

Regarding the age, the hypothesis that is examined says that the aged ETFs are more experienced and, consequently, they should seem more reliable or attractive to investors. Investors would respond to this accumulated experience and

knowledge by placing more money to these funds. The opposite should be the case about the relationship between assets and expenses. In particular, one should expect that ETFs charging higher fees will hold less assets than the low-cost ETFs.

Going further, the historical return should be positively related to assets, given that investors tend to invest more money in funds with great historical performance records, even though past returns do not guarantee the future ones. A similar positive relationship would be expected between assets and ETFs' trailing dividend yield. Given that dividends, along with capital gains, constitute the entire financial profit realised to an ETF investor, the higher the dividends paid by an ETF, the more attractive the ETF will be. If this assumption is true, investors should invest more money in ETFs with significant dividend payments.

From the plethora of ETFs, strong Morningstar return ratings should probably allure more ESG investors, who could probably combine responsible investing with significant financial gains. On the other hand, strong ESG ratings should obviously entail that the corresponding ETFs enjoy increased popularity with ESG investors, who will allocate more money to them. Finally, when it comes to carbon intensity, which is a measure on an ETFs' exposure to carbon intensive companies, the correlation with the assets held by an ETF should be negative. This means that the ESG-sensitive investors should withdraw their money from ETFs with a high carbon exposure in favor of ETFs with a low carbon intensity.

2.2. Analysis of performance

The second issue examined regards the factors that possibly affect the performance of ETFs. The focus is paid on the relationship between ETFs' performance and ESG rating. The key assumption made here is that ESG investors should award ETFs having an increased ESG sensitivity with an increased demand for their shares. The increased demand will raise the prices of ETFs and, thus, returns will ascend too.[2]

Additional elements that might affect the returns of ETFs that are considered in our analysis are the return of the underlying indexes along with the age of ETFs, expense ratios, Morningstar return rating and carbon intensity.

[2] The boosting impact on ETF performance by the ESG records is probably more indirect than this assumption suggests. In particular, the increased demand for the shares in ETF could affect the premium or discount of ETFs, but finally the return depends on NAV, which is strongly correlated with the tracked index. However, increasing the demand for an ETF may affect the value of the index and, consequently, the NAV of ETFs, as the accumulated funds are invested in the relevant stocks. Moreover, when the return of ETFs is computed with trade prices, the increasing demand for their shares should result in a rise in their trade prices and, thus, in their returns, for a given level of supply.

The analysis of performance is applied using the following cross-sectional regression Model (2):

$$Ret = \lambda_0 + \lambda_1 Ind + \lambda_2 Age + \lambda_3 ExpRat + \lambda_4 StarRet + \lambda_5 ESGRate + \lambda_6 Carb + u \quad (2)$$

where: *Ind* is the historical return of each ETF's benchmark that spans the same period as the historical return of the ETF. The other variables are defined as above.

When it comes to the return of benchmarks, it is obvious that, as ETFs are passively managed and track specific indexes, their performance should be explained to a large extent by their benchmarks. Consequently, a highly significant and positive estimate of the *Ind* factor in the model is expected.

A positive estimate of the age factor could be expected as well. The reason behind this expectation is that the more aged a fund is, the most skillful its managers should be. Enhanced managerial skills could entail that profitable investment opportunities are exploited resulting in higher financial gains for investors. However, the literature has shown (e.g. Howell, 2001) that young funds outperform the oldest ones. If this finding applies to ETFs too, a negative sign for the age factor would not surprise us.[3]

As far as expenses are concerned, it is well-documented in the literature on the actively managed mutual funds, index funds and ETFs that expenses erode performance (e.g. Carhart, 1997; Blitz et al., 2012). Therefore, the estimate of the expense ratio factor must be negative and significant.

The Morningstar return rating of an ETF should bear a positive correlation with the actual return of the fund. In addition this factor is added to the model in order to detect whether investors perceive performance rating as an indicator of promising returns in the short- or the longer-run. If this assumption is true, the increased buying activity of investors for an ETF should trigger higher returns.

Finally, when it comes to the ESG metrics that are taken into consideration in the model, two hypotheses are made. The first one says that the higher the ESG rating of an ETF is, the higher the performance of this fund will be, due to the increased demand of investors for it. The second hypothesis says that the carbon intensity of an ETF should exert a negative influence on its performance, as ESG investors will avoid this fund, due to its exposure to carbon intensive firms. In other words, the second assumption says that the higher the carbon intensity of an ETF is, the lower the performance of the fund should be.

[3] In another view, given that the primary target of the passively managed ETFs is to replicate the performance of benchmarks, rather than achieving higher returns than the benchmark, the age factor can be considered as an explanatory variable of an ETF's tracking error or expense ratio. To explain the factors that affect the tracking error and the expense ratio of ETFs is out of the scope of the current paper.

2.3. ESG rating vs performance rating

Along with the key issues described above, we assess the relationship between the performance rating of ETFs and their ESG rating. We do so by applying the following single-factor cross-sectional Model (3):

$$StarRate = \lambda_0 + \lambda_1 ESGRate + u \tag{3}$$

where: $StarRate$ and $ESGRate$ are defined as above. Should the two rating measures significantly relate to each other, a positive estimate of the λ_1 coefficient approximating unity will be obtained. If this expectation is verified, the inference to be reached will be that responsible investing goes hand in hand with profitable financial targets.

2.4. ESG rating vs tracking error and expenses

The last research questions that are examined concern the relationship between the ESG rating of ETFs with their tracking error and expenses. We have already noted that, due to the screening techniques that are usually applied by the ESG ETFs,[4] increased tracking errors and expenses are to be expected. We assess whether this assumption is true by applying the following single-factor cross-sectional Models (4) and (5):

$$TE = \lambda_0 + \lambda_1 ESGRate + u \tag{4}$$

and

$$ExpRat = \lambda_0 + \lambda_1 ESGRate + u \tag{5}$$

where: TE is an unsophisticated measure of ETFs' tracking error that is calculated as the difference in historical returns of ETFs and benchmarks; $ExpRat$ and $ESGRate$ are defined as above. If our assumption about the relationship between the ESG rating of ETFs and their tracking error and expenses is right, a positive λ_1 coefficient in Models (4) and (5) will be estimated.

[4] Screening techniques may entail that some stocks are avoided by the ESG ETFs (of course if they are allowed to do so, due to their passive nature). If this is true, higher tracking errors (in absolute terms) could be expected. This is the common belief in the fund industry.

2.5. Data and statistics

In this section we provide information on the sample of the study, the ESG profiles of the examined ETFs and data on their performance.

2.5.1. Sample

The sample of the study includes 168 equity ETFs (called iShares), which are managed by BlackRock, that is, the leader in the global ETF market. All these ETFs are evaluated by MSCI and Morningstar for ESG purposes. They are also monitored and evaluated by Morningstar for financial performance purposes. The availability of ESG and performance ratings was the main selection criterion for the consideration of an ETF in the sample. The sufficiency of return data (at least three years of returns as of 31.12.2020) was another selection criterion. Therefore, the minimum return period covered by each fund in the sample spans from 1.1.2018 to 31.12.2020.

It should be noted here that we deem the sample of ESG iShares as quite representative of the entire market of ESG ETFs in the US. We believe so, because BlackRock, which is the managing company of iShares, possesses the biggest market share in the United States.[5] In addition, as ESG ETFs are basically passively managed, as most ETFs, we believe that no significant declines are to be observed in the managing practices of ESG ETFs between BlackRock and other companies. For these two key reasons, we deem that we can use iShares to draw general conclusions about ESG ETFs.

Table 1 presents the financial profile of the sample, which includes the age of the funds (in years) as of 31.12.2020, their latest expense ratio, which is computed as the total portion of an ETF's assets (in percentage terms) devoted to the administration of the fund, the 12m percentage trailing yield, which is the percentage income an ETF portfolio returned over the past 12 months as of 31.12.2020, calculated as the weighted average of the yields of the stocks that compose the portfolio, and the net assets under management of ETFs as of 31.12.2020. In addition, ETFs are classified according to their asset class, i.e. the capitalisation level of stocks they select, the region focus and the state of the underlying market, which is developed or emerging.[6]

The age of ETFs is about 14 years, both in average and median terms. The majority of ETFs (110 funds) are more than 10 years old (not shown in the Table 1).

[5] BlackRock's market in the ETF market as of February 2022 is 33.99%. This is the leader in the market. The second company is Vanguard with a market share of 29.12%. For more information on market shares in the US, refer to Statista (2022).

[6] All the information presented here has been found on www.iShares.com.

Table 1. Profiles of ETFs

Stats	Age	Expense ratio (%)	12m trailing yield (%)	Net assets (USD)	
Average	13.67	0.38	1.66	9,189,587,862	
Median	14.31	0.39	1.44	1,603,910,039	
St. Dev.	5.88	0.22	0.97	24,309,971,242	
Minimum	3.15	0.03	0.08	3,331,562	
Maximum	24.82	1.48	5.44	255,556,728,943	
Total	N/A	N/A	N/A	1,543,850,760,793	
Asset Class	**No of ETFs**	**Region**	**No of ETFs**	**Market**	**No of ETFs**
All cap	67	Asia Pacific	18	Developed	147
Large cap	15	Europe	6	Emerging	21
Large/mid cap	59	Global	58	**Total**	**168**
Mid cap	9	Latin America	3		
Mid/small cap	1	North America	83		
Small cap	17	**Total**	**168**		
Total	**168**				

Source: https://www.ishares.com

The age of ETFs indicates that they are well-established in the market. In addition, the managers of these funds must be quite experienced, a factor that should contribute to the efficient management of the funds and, possibly, to their financial performance.

The expense ratio is about 0.4%, which is quite low compared to fees charged by actively managed mutual funds or ETFs, as a result of the passive nature of ETFs in the sample. However, the data shows that there is a wide dispersion in expense ratios. The lowest expense ratio amounts to 3 basis points (bps), while the highest approximates 150 bps. From a further analysis of expense ratios, we note that the highest expense ratios mainly concern ETFs with an international focus. This finding is not new in the literature. In any case, the dispersion of expense ratios entails that investors should be very careful when choosing ETF products, because they might end up with expensive funds that will erode the profits of their investments.

When it comes to the dividends accrued to ETF portfolios, an average 12m trailing yield of 1.66% is reported in Table 1. The lowest yield is 0.08%, and the maximum yield well exceeds 5%. A deeper examination of the trailing yields shows that the highest yields mainly concern ETFs that focus on domestic or international companies that have provided consistent high dividend yields over time. Whether these dividend records are satisfactory or not depends on the preferences and income targets of each investor.

In regard to assets, the total amount of money invested in the sample's ETFs as of 31.12.2020 was 1.54 trillion dollars.[7] The average amount of assets held by ETFs is 9.2 billion dollars. However, there is a wide variation in assets held by the individual funds in the sample. The smallest fund manages only 3.3 million dollars, while the biggest one holds more than 255 billion dollars.[8] By descending the assets held by each ETF, we observe that the top ten funds are mainly focused on the US market, with the exception of two ETFs that invest in the EAFE region and other two ETFs which cover indexes from emerging markets.

With respect to the asset class, about half of ETFs in the sample invest in stocks with mid or large capitalisation. The regions covered mostly concern the stock markets in the North America, whereas the second biggest group of ETFs have a global orientation. Finally, 88% of ETFs invest in stocks of developed capital markets.

2.5.2. ESG profiles

The ESG profiles of ETFs (found on iShares.com) are presented in Table 2. These profiles include the ESG Quality Score (0–10), which is provided by MSCI, the Weighted Average Carbon Intensity (tons CO2E/$m Sales), which is measured by MSCI as a proxy for the exposure of an ETF to carbon intensive companies, the MSCI ESG % Coverage, which is the percentage of an ETF's holdings that have MSCI ESG ratings data, and the MSCI ESG Rating, which is calculated as a direct mapping of ESG quality scores to letter rating categories. An alternative ESG Rating of ETFs estimated by Morningstar is also provided in Table 2. This rating is a measure of the financially material ESG risks in an ETF portfolio relative to the ETF portfolio's peer group. The MSCI ESG ratings range from leader (AAA, AA), average (A, BBB, BB), to laggard (B, CCC). The Morningstar ESG rating ranges from 1 star (low) to 5 stars (high). The assets in each ESG rating range (i.e. MSCI and Morningstar) are provided as well so as to make a first assessment of whether there is a direct relationship between the ESG rating of an ETF and its assets.

The average (and median) MSCI ESG quality score is 5.75. This figure shows that the majority of ETFs in the sample (121 out of 168 funds) are "a pass" for ESG purposes. The minimum and maximum MSCI ESG scores are 1.65 and 9.78, respectively. The average carbon intensity measure is 221 tons of CO2E per mil-

[7] By the end of 2020, the net assets held by ETFs worldwide amounted to about 7.74 trillion dollars (Statista.com). Thus, the 1.54 trillion dollars managed by iShares in the sample approximates 20% of the global ETF market. This figure verifies that our sample is quite representative of the entire ETF market and, consequently, the empirical findings of this study can be applicable to ETFs as a whole.

[8] Not surprisingly, the biggest ETF in the sample is the iShares Core S&P 500 ETF (IVV), which tracks the S&P 500 Index.

Table 2. ESG profile of ETFs

Stats	MSCI ESG quality score (0–10)	MSCI weighted average carbon intensity (tons CO2E/$m sales)	MSCI ESG (% coverage)
Average	5.75	220.82	98.49
Median	5.75	141.72	99.57
St. Dev.	1.26	287.17	3.24
Minimum	1.65	2.85	78.65
Maximum	9.78	2,501.95	100.00

MSCI ESG Rating	Range	No of ETFs	Net assets		
			average	minimum	maximum
AAA	leader	1	1,311,762,859	1,311,762,859	1,311,762,859
AA	leader	24	8,953,159,773	6,294,267	87,562,446,175
A	average	62	3,825,225,966	3,492,199	29,241,578,662
BBB	average	63	15,086,056,004	3,331,562	255,556,728,943
BB	average	16	8,686,617,480	64,517,796	67,761,827,657
B	laggard	2	545,872,776	324,444,335	767,301,218
CCC	laggard	0	0	0	0
Total		**168**			

Morningstar ESG Rating	Range	No of ETFs	Net assets		
			average	minimum	maximum
5 stars	high	11	2,631,493,707	48,941,330	6,572,078,865
4 stars	above average	38	3,539,532,266	143,027,229	19,966,300,264
3 stars	average	72	13,714,429,273	3,331,562	255,556,728,943
2 stars	below average	39	9,307,232,980	30,745,286	79,625,508,965
1 star	low	8	3,747,638,756	64,517,796	15,878,800,468
Total		**168**			

Source: the MSCI ESG metrics are found on https://www.ishares.com. The Morningstar ESG metrics are found on https://www.morningstar.com

lion of sales. By descending the individual measures of ETFs, we see that 50 funds present carbon intensity metrics exceeding the average term of the sample. The average MSCI ESG percentage coverage is very high approximating 100%. So far, we draw a view of a relatively positive ESG impact of ETFs in the sample.

In regard to the overall ESG rating awarded by MSCI, we see in Table 2 that the majority of ETFs are averages or above. More specifically, 141 funds are rated as average for ESG purposes, 25 ETFs are classified as leaders and only 2 funds are laggards. The 3A rating is credited just to one ETF, while no ETF receives the bottom ESG rate.

On the relationship between the MSCI ESG rating and the assets held by ETFs, we see that the fund with the absolute 3A rate manages only 1.3 billion dollars. The highest average term of assets among the 7 ESG classes of ETFs concerns the fourth one. This group also contains the lowest and the highest records of assets among all ETFs in the sample. This unsophisticated analysis offers a first hint on an insignificant correlation between ESG rating and assets.

Similar inferences are reached through the analysis of Morningstar ESG rates. In particular, the majority of ETFs (121 out of 168 funds) receive 3 ESG stars or above. The average (3 stars) class contains the highest records of assets, while the top class (5 stars) includes the lowest ones. Therefore, once again, it seems that the ESG rating of ETFs and their assets are not correlated to each other.

To summarise this section, the data on the ESG performance of iShares show that these ETFs exert a rather positive influence, from an environmental, social and governance perspective. However, it seems that investors do not reward the good ESG behavior of ETFs with more money, given that the funds with the highest ESG metrics do not attract the highest asset records.

2.5.3. Performance of ETFs

The raw return of ETFs is discussed in this section. Table 3 presents the average quarterly percentage return in Net Asset Value (NAV) and price terms over 1 year, 3 years, 5 years, 10 years and since the inception for each ETF. The minimum period covered by each ETF in the sample spans from 1.1.2018 to 31.12.2020. The returns have been found on the website of iShares. A measure of return premium is presented as well. This premium is calculated as the difference between the price and NAV returns of ETFs. A simple measure of ETFs' tracking error is also presented. The tracking error is computed as the difference in returns between ETFs and benchmarks, in NAV and price terms. The performance rating of Morningstar is also presented along with the assets in each rating range. Morningstar performance rating ranges from 1 star (low) to 5 stars (high). These ratings are published on the website of Morningstar.

Table 3. Performance of ETFs

Stats	1 year (%)	3 year (%)	5 year (%)	10 year (%)	Since inception (%)
Average quarterly NAV returns of ETFs					
Average	12.21	7.90	11.38	9.55	7.23
Median	11.55	6.65	10.61	10.28	7.37
St. Dev.	16.50	8.40	6.56	6.09	4.09
Minimum	–42.87	–30.57	–18.87	–13.48	–8.69
Maximum	56.00	32.43	35.06	22.67	17.64
No of ETFs	168	168	155	110	168
Average quarterly price returns of ETFs					
Average	12.13	7.86	11.38	9.52	7.22
Median	11.50	6.60	10.59	10.26	7.35
St. Dev.	16.50	8.39	6.57	6.11	4.09
Minimum	–42.89	–30.61	–18.88	–13.49	–8.69
Maximum	56.25	32.38	35.04	22.66	17.64
No of ETFs	168	168	155	110	168
Return premium of ETFs (average quarterly price return—average quarterly NAV return)					
Average	–0.07	–0.04	0.01	–0.03	–0.01
Median	–0.03	–0.04	0.01	–0.01	0.00
St. Dev.	0.40	0.11	0.30	0.05	0.03
Minimum	–1.44	–0.40	–3.46	–0.29	–0.13
Maximum	1.40	0.63	0.50	0.08	0.10
No of ETFs	168	168	155	110	168
Tracking error of ETFs (NAV return terms)					
Average	–0.29	–0.22	–0.25	–0.28	–0.25
Median	–0.24	–0.21	–0.22	–0.24	–0.23
St. Dev.	0.40	0.28	0.28	0.25	0.29
Minimum	–2.78	–1.23	–1.57	–1.04	–1.20
Maximum	0.68	0.87	0.32	0.40	1.46
No of ETFs	168	168	155	110	168
Tracking error of ETFs (price return terms)					
Average	–0.36	–0.26	–0.24	–0.31	–0.25
Median	–0.30	–0.26	–0.21	–0.26	–0.23
St. Dev.	0.60	0.30	0.39	0.26	0.29
Minimum	–3.38	–1.36	–3.61	–1.09	–1.23
Maximum	1.19	0.55	0.43	0.35	1.37
No of ETFs	168	168	155	110	168

Table 3 – cont.

Stats	1 year (%)	3 year (%)	5 year (%)	10 year (%)	Since inception (%)
Morningstar performance rating	Range	No of ETFs	Net assets		
			average	minimum	maximum
5 stars	high	21	18,540,396,199	47,603,080	255,556,728,943
4 stars	above average	47	12,064,664,442	51,979,770	87,562,446,175
3 stars	average	64	7,355,566,350	6,294,267	79,625,508,965
2 stars	below average	30	3,741,706,861	3,331,562	29,241,578,662
1 star	low	6	742,626,600	15,825,115	2,946,705,265
Total		**168**			

Source: the returns of ETFs and indexes are found on https://www.ishares.com

Focusing on short-term returns, it seems that iShares performed very well during 2020. The average return of the sample for the year is about 12%, both in NAV and price terms. Moreover, the average return of ETFs in each time frame considered is positive and significant. In the long-run, the average historical (since inception) return of ETFs is about 7%. By examining the historical return records of individual ETFs, we see that more than half of ETFs perform above the average term. Overall, these return records indicate that the performance that has been received by an investor in ETFs over time is quite satisfactory.

From the comparison of ETF returns computed with NAVs and trade prices, we see that there are no significant differences between them. In addition, the minimum and maximum discounts/premiums just exceed 10 bps. These measures entail that the mispricing of iShares, namely the differences between the prices of ETFs on the stock exchange and the net value of their assets per share, is minor and possibly very short lasting. This is possibly due to the unique "in-kind" creation and redemption process of ETF shares and the high liquidity of the relevant market, which enhances this process.

In regard to tracking error, Table 3 shows that ETFs slightly underperform their benchmarks on a constant basis. In each period considered, the average tracking errors are negative, either when the NAV returns of ETFs or when the price returns of ETFs are assessed. An additional interesting element is that, with the exception of the "since inception" period, the highest underperformance of ETFs (in absolute terms) is considerably greater than the respective outperformance. The average historical tracking error (underperformance) of ETFs in NAV and trade price terms is –0,25%. Even though this figure is not that high, being, at the same time, lower

than the average expense ratio, it shows that the absolute return alignment between ETFs and their benchmarks is not feasible.

The tracking error could be attributed to the expenses charged by ETFs, which are taken into consideration in the calculation of their NAVs, while the benchmarks do not reflect any expenses at all. Moreover, in the case of ETFs with an international focus, the differences in the trading hours between the stock exchange in the US and the local stock exchanges, where the international stocks are traded, also induce the tracking error.

In addition to raw returns, we pay attention to the performance rating awarded to ETFs by Morningstar with respect to the assets held by each rating group. In particular, the most crowded group is the average one (three stars), which includes 64 ETFs. 47 ETFs receive a four-star rating and just 21 out of 168 ETFs get five stars. On the "below average" side, 30 ETFs take two stars and only 6 receive 1 star. This analysis confirms in another way that, overall, the performance of ETFs overtime is quite considerable.

When it comes to assets, we see the five-star group to possess, on average, the highest levels of assets. This group also includes the biggest ETF in the sample. Moreover, as we move to the lower groups, we see that the average amounts of assets held by each group descends. This simplified analysis of performance and assets entails that a positive correlation between ETFs' return and assets must exist and provides a first verification of our expectation about this relationship.

3. Empirical findings

The empirical findings of the econometric analysis are presented in this section. We begin with the analysis of assets and continue with the results on performance and the relationship between ESG and performance rating. We conclude with the correlation between the ESG rating of ETFs with their tracking error and expense ratios.

3.1. Analysis of assets

The results of the regression Model (1) on the explanatory variables of ETFs' assets are presented in Table 4. The table contains the estimates of the independent factors considered along with the *T*-test *n* the statistical significance of the estimates. The *R*-squared is included as well. We note that several versions of Model (1) are presented. In particular, the model is applied with the two alter-

Table 4. Regression analysis of assets

Variable	Estimate	*T*-test	Variable	Estimate	*T*-test
Constant	8.49*	17.57	Constant	8.50*	17.58
Age	0.06*	5.63	Age	0.06*	5.62
Expense ratio	–1.30*	–4.54	Expense ratio	–1.31*	–4.54
Historical return (NAV)	0.05*	2.65	Historical return (price)	0.04*	2.62
12m trailing yield	0.01	0.10	12m trailing yield	0.01	0.09
Morningstar return rating	0.01	0.20	Morningstar return rating	0.01	0.21
MSCI ESG rating	0.02	0.29	**MSCI ESG rating**	0.02	0.28
Carbon intensity	0.00	–1.06	Carbon intensity	0.00	–1.06
R-squared	0.34	–	*R*-squared	0.34	–
Obs.	168	–	Obs.	168	–
Constant	8.50*	17.78	Constant	8.50*	17.79
Age	0.06*	5.64	Age	0.06*	5.68
Expense ratio	–1.30*	–4.54	Expense ratio	–1.31*	–3.71
Historical return (NAV)	0.05*	2.65	Historical return (price)	0.04*	3.21
12m trailing yield	0.01	0.10	12m trailing yield	0.01	0.09
Morningstar return rating	0.01	0.22	Morningstar return rating	0.01	0.22
MSCI ESG score	0.01	0.27	**MSCI ESG score**	0.01	0.29
Carbon intensity	0.00	–1.06	Carbon intensity	0.00	–1.45
R-squared	0.34	–	*R*-squared	0.34	–
Obs.	168	–	Obs.	168	–
Constant	20.25*	21.57	Constant	20.27*	21.59
Age	0.14*	5.84	Age	0.14*	5.83
Expense ratio	–2.98*	–3.76	Expense ratio	–2.99*	–3.76
Historical return (NAV)	0.11*	3.27	Historical return (price)	0.10*	3.23
12m trailing yield	–0.03	–0.16	12m trailing yield	–0.03	–0.17
Morningstar return rating	0.04	0.27	Morningstar return rating	0.04	0.28
Morningstar ESG rating	–0.17	–1.36	**Morningstar ESG rating**	–0.17	–1.36
Carbon intensity	0.00	–1.38	Carbon intensity	0.00	–1.38
R-squared	0.35	–	*R*-squared	0.35	–
Obs.	–	–	Obs.	–	–

Note: * statistically significant at 1%.

Source: own study.

native types of raw return examined, that is the NAV return and the trade price return. In addition, with respect to ESG rating metrics, we successively use the MSCI ESG rating, the MSCI ESG score and the Morningstar ESG rating. Finally, we note that we have applied multicollinearity testing, finding no such bias; whereas, when necessary, the results are corrected for heteroskedasticity.

With respect to the intercept of the model, we observe that all the individual estimates are high and statistically significant. This fact indicates that the model has not captured all the factors that possibly affect the level of assets managed by ETFs.

In regard to age, all the versions of the model offer positive and statistically significant estimates. Even though the magnitude of estimates is not that high (it ranges from 0.06 to 0.14), their statistical significance and the positive sign verify our assumption about a direct relationship between the assets held by an ETF and its age.

The opposite relationship is accentuated by the empirical results between assets and the expense ratios of ETFs. All the relevant coefficients in Table 4 are significantly negative, while their magnitude is high. The lowest estimate for the expense ratio factor is –1.30 and the highest is –2.99. In any case, our expectation about a negative correlation of the level of assets managed by an ETF and the expenses charged to investors by the fund is verified.

Another assumption confirmed by the empirical findings is that about the positive relationship between assets and the historical returns of ETFs. All the single coefficients are positive and statistically significant at the 1% level. The estimates range from 0.04 to 0.11. Even though these coefficients are quite small, the significantly positive impact they reveal verifies that ETFs with great historical return records should be more attractive to investors.

The coefficients of returns are the last statistically significant estimates of the model. The other factors considered, namely the 12m trailing yield, the Morningstar performance rating, the various types of ESG rating and the carbon intensity factor offer no statistically significant estimates.

The most interesting inference drawn from this lack of statistically significant estimates is that the ESG behavior of ETFs does not seem to be relevant to investors when they make their investment decisions. In other words, the ESG responsibility of ETFs is not rewarded with more money by investors. This conclusion aligns with the respective inference we reached when assessed the relationship between the ESG profile of ETFs and their assets, in Section 4.2.

3.2. Analysis of performance

The results of the econometric analysis of ETFs' performance are presented in Table 5. Similarly to Model (1), several versions of Model (2) are applied with

the use of several alternative types of raw returns and ESG metrics. The table reports the estimates of the explanatory variables, *T*-test and the *R*-squared of each model. Multicollinearity testing has been applied with no such findings and, when necessary, the results have been corrected for heteroskedasticity.

Table 5. Regressions analysis of performance

Dependent variable: ETFs' NAV return			Dependent variable: ETFs' price return		
variable	**estimate**	***T*-test**	**variable**	**estimate**	***T*-test**
Constant	0.16	0.74	Constant	0.14	0.66
Index return	0.99*	170.12	Index return	0.99*	170.23
Age	–0.02*	–3.69	Age	–0.02*	–3.70
Expense ratio	–0.52*	–4.98	Expense ratio	–0.51*	–5.01
Morningstar return rating	0.03	1.42	Morningstar return rating	0.03	1.54
MSCI ESG rating	0.00	–0.10	**MSCI ESG rating**	–0.01	–0.13
Carbon intensity	0.00	0.64	Carbon intensity	0.00	0.68
R-squared	1.00		*R*-squared	1.00	
Obs.	168		Obs.	168	
Constant	0.22	0.92	Constant	0.19	0.84
Index return	0.99*	175.43	Index return	0.99*	175.18
Age	–0.02*	–3.73	Age	–0.02*	–3.74
Expense ratio	–0.52*	–4.95	Expense ratio	–0.51*	–4.98
Morningstar return rating	0.03	1.31	Morningstar return rating	0.03	1.43
MSCI ESG score	–0.01	–0.33	**MSCI ESG score**	–0.01	–0.36
Carbon Intensity	0.00	0.68	Carbon intensity	0.00	0.71
R-squared	1.00		*R*-squared	1.00	
Obs.	168		Obs.	168	
Constant	0.24**	2.09	Constant	0.21***	1.81
Index return	0.99*	182.02	Index return	0.99*	184.28
Age	–0.01*	–4.30	Age	–0.01*	–4.25
Expense ratio	–0.51*	–5.24	Expense ratio	–0.50*	–5.24
Morningstar return rating	0.03	1.40	Morningstar return rating	0.03	1.53
Morningstar ESG rating	–0.05**	–2.20	**Morningstar ESG rating**	–0.04**	–2.04
Carbon intensity	0.00	0.71	Carbon intensity	0.00	0.78
R-squared	1.00		*R*-squared	1.00	
Obs.	168		Obs.	168	

Note: * statistically significant at 1%; ** statistically significant at 5%; *** statistically significant at 10%.

Source: own study.

The estimates of benchmark returns are all positive and highly significant. In fact, these estimates approximate unity. This finding is not surprising, given the passive nature of the ETFs in the sample. Therefore, more or less, the raw return of ETFs is explained by the return of the tracking indexes.

When it comes to the age factor, the results do not verify our hypothesis about a positive relationship between the performance of an ETF and its age. On the contrary, we obtain negative and significant ones, in all the versions of the model. These findings are not surprising because the literature has already shown that, in several cases, the young funds outperform the oldest ones. However, their absolute magnitude does not exceed 2 bps. Therefore, though being statistically significant, the economic significance of these negative estimates for age should be considered limited.

On the contrary, the relationship between the raw returns of ETFs and their expense ratios is significant, both from a statistical and an economic perspective. The single coefficients for the expense ratio variable are around –50 bps and verify the common knowledge in the industry that administrative and other fees charged by ETFs erode the performance that is received by investors.

The Morningstar return rating is irrelevant since no statistically significant estimates are obtained for this factor. This is also the case for the MSCI ESG metrics and carbon intensity. However, the Morningstar ESG rating seems to be negatively related to the raw returns of ETFs. The model derives two negative estimates which are significant at the 1% level. These estimates amount to –4 and –5 bps, respectively. This negative correlation indicates that investors may assume that ESG responsibility on behalf of ETFs may result in a financial sacrifice, in terms of lower returns.

3.3. ESG rating vs performance rating

The results of Model (4) on the relationship between the ESG rating of ETFs and their performance rating are presented in Table 6. The model is applied with the Morningstar performance rating as a dependent variable and, successively, with the MSCI and the Morningstar ESG rating metrics as an independent variable. We note that, for comparability purposes, before running the first version of the model, we graded the leader class per the MSCI ESG rating (score) method with 3 points, the average class with 2 points and the laggard class with 1 point. Similarly, we graded the 5-star and 4-star classes per the Morningstar ESG rating system with 3 points, the 3-star class with 2 points and the 2-star and 1-star classes with one point. In the second version of the model we kept the ESG and return star-ratings awarded by Morningstar with no adjustments.

Table 6. ESG Rating vs Performance Rating

Variable	Estimate	*T*-test	Variable	Estimate	*T*-test
Constant	2.30*	9.83	Constant	2.60*	9.44
MSCI ESG rating	–0.05	–0.48	MSCI ESG score	–0.07	–1.51
R-squared	0.00		*R*-squared	0.01	
Obs.	168		Obs.	168	
Morningstar ESG rating	0.14**	1.73			
R-squared	0.12				
Obs.	168				

Note: * statistically significant at 1%; ** statistically significant at 10%.

Source: own study.

When we consider the relationship between the Morningstar returns ratings and the MSCI ESG metrics, no significant relationship is revealed. On the contrary, in the case of the Morningstar return and ESG ratings, there seems to be some correlation between them. The coefficient of the model's slope is 0.14 being significant at the 10% level. This estimate indicates that, to some extent, the performance and the ESG rating of ETFs offered by Morningstar relate to each other. This could entail that responsible investing does not necessarily result in financial sacrifices. However, this relatively significant estimate of the model's slope might be the result of similarities in the methods applied by Morningstar when rating ETFs from a performance and an ESG perspective.

3.4. ESG rating vs tracking error and expenses

The results on the correlation between ETFs' ESG metrics and tracking error and expense ratios are provided in Table 7. As in the previous models, several versions are examined with the alternative types of ESG rating and score and two kinds of tracking errors resulting from the use of ETFs' NAV and trade price returns.

With respect to the tracking efficiency, the only significant slope estimated is that concerning the relationship between the tracking error and the ESG rating of Morningstar. For both versions of tracking error, the coefficient of the Morningstar ESG rating is significantly negative and amounts to –0.06. This result contradicts our expectation, as well as the belief of the industry, about a positive correlation between responsible investing and tracking error. Based on this finding, and despite the small magnitude of the estimates, we may infer that, even though tracking error in ETF investments is unavoidable, high ESG ratings could be a sign

Table 7. ESG rating vs tracking error and expenses

Dependent variable: ETFs' NAV tracking error			**Dependent variable: ETFs' price tracking error**		
Variable	**Estimate**	***T*-test**	**Variable**	**Estimate**	***T*-test**
Constant	–0.32*	–2.91	Constant	–0.33*	–2.96
MSCI ESG Rating	0.02	0.71	MSCI ESG Rating	0.02	0.66
R-squared	0.00		*R*-squared	0.00	
Obs.	168		Obs.	168	
Constant	–0.25	–2.40	Constant	–0.26	–2.46
MSCI ESG Score	0.00	0.06	MSCI ESG Score	0.00	0.00
R-squared	0.00		*R*-squared	0.00	
Obs.	168		Obs.	168	
Constant	–0.07	–0.90	Constant	–0.09	–1.20
Morningstar ESG Rating	–0.06**	–2.58	Morningstar ESG Rating	–0.06**	–2.43
R-squared	0.04		*R*-squared	0.03	
Obs.	168		Obs.	168	
Constant	0.35*	4.14	Constant	0.32*	4.02
MSCI ESG Rating	0.01	0.36	MSCI ESG Score	0.01	0.78
R-squared	0.00		*R*-squared	0.00	
Obs.	168		Obs.	168	
Constant	0.38*	6.81			
Morningstar ESG Rating	0.00	–0.11			
R-squared	0.00				
Obs.	168				

Note: * statistically significant at 1%; ** statistically significant at 5%.

Source: own study.

of lower tracking errors. This element could be a selection criterion for investors when choosing among the vast universe of ETF investments.

When it comes to the expenses, no significant slopes are obtained. Therefore, a material relationship between the expenses of ETFs and their ESG ratings cannot be established. Based on these results, the belief in the industry which says that responsible investing comes with a higher cost (and not only in performance terms) is not verified.

Conclusions

This paper employs a sample of 168 passive ETFs and tries to answer two key questions concerning the application of environmental, social and governance criteria when choosing ETF products. The first one asks whether investors reward ETFs having high ESG scores by entrusting more assets to them. The hypothesis that is made in this respect is that the more responsible ETFs should attract more money than the less responsible ETFs. In other words, a positive correlation should exist between the ESG metrics of an ETF and the magnitude of the assets it manages. The empirical findings do not confirm this assumption. In fact, the results show that there is no relationship between the ESG rating and the level of assets managed by an ETF.

Our analysis shows that there are other factors that can affect the assets of ETFs, such as their historical return. On this matter, the results indicate that ETFs with strong past returns are more alluring to investors, who choose to allocate more money to the most performing funds. An opposite correlation is the case between the assets and the expense ratios of ETFs. This means that the more expensive an ETF is, the lower the amount of its assets should be. Finally, the age of ETFs seems to have a minor but significantly positive relationship with assets. This fact entails that the aged ETFs are perceived as those with the most experienced and skillful managers. Skills and experience might be indicative of more efficient management, which, in turn, should mean that available profitable investment choices are exploited.

The second issue examined concerns the factors that affect the performance of ETFs. Special focus is put on whether the ESG metrics of ETFs are somehow related to their returns. The regression analysis performed reveals that such a relationship does not exist. In other words, the responsible behavior of ETFs is not reflected in higher or lower returns. The main factor that defines the returns of ETFs is the return of the underlying indexes. The expense ratio is another factor that affects the performance of ETFs. More specifically, a negative and significant coefficient for the expense ratio is obtained from the regression analysis.

Along with the key research questions raised above, we assess whether the ESG metrics and the performance rating of ETFs are related to each other. This issue is examined with the use of MSCI and Morningstar ESG ratings and metrics on the one hand, and the Morningstar performance rating on the other. The results show that the MSCI ESG ratings and scores hold no relationship with the Morningstar return ratings. On the contrary, there is a slightly positive correlation between the ESG and return ratings awarded by Morningstar. It might be considered that the latter evidence indicates that an ETF with a high ESG rating stands some chances of being ranked at the top performing classes, from a financial perspective.

In the last step, we investigate whether there is a relationship between the ESG metrics of ETFs and their tracking errors and expenses. This possibility is examined because it is frequently believed in the industry that a high ESG responsibility entails that higher tracking errors and expenses are shouldered to investors. Our results show that there is no relationship, of any kind, between the ESG metrics and the tracking errors and expense ratios of the ETFs in the sample.

Overall, our study belongs to that strand of the literature which favours the idea saying that ESG investing and financial performance cannot be related to each other. Based on this conclusion, ETF investors should choose their investments based on their targets and preferences, either financial or ESG, because a profitable combination of different aims does not seem to be feasible.

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Poznań University of Economics and Business

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Economic openness, institutional quality and *per capita* income: Evidence from the Economic Community of West African States (ECOWAS)

Innocent Chile Nzeh[1]

Hycenth Oguejiofoalu Richard Ogwuru[2]

David Ogomegbunam Okolie[3]

Jonathan Ibekwe Okolie[4]

Abstract

The controversy surrounding the actual impact of institutional quality and economic openness on economic growth is among the motivating factors for this study. The study seeks to investigate this relationship in the Economic Community of West African States (ECOWAS) by using the panel autoregressive distributed lag (ARDL) test with annual series covering the period from 2000 to 2020. Findings indicate that in the short-run, regulatory quality and FDI outflows had an adverse impact on the economic performance of the ECOWAS bloc. Furthermore, the long-run results show that trade openness, political stability and FDI outflows had an adverse impact on the economy of the bloc, while regulatory quality positively affected the economy. Consequently, the paper recommends that member countries in the ECOWAS bloc should put in place effective regulatory framework in the short and medium term to attract FDI inflows, while building a strong and stable political environment in the long term.

Keywords

- FDI inflows
- openness of the economy
- regulatory quality
- institutional quality

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[1] Renaissance University, P.M.B. 01183 Enugu, Enugu State, Nigeria, corresponding author: nzechile@yahoo.com

[2] Novena University, Ogume, PMB 2, Kwale, Delta State, Nigeria, profecahoro@gmail.com

[3] Renaissance University, Nigeria, davidokolie799@gmail.com

[4] Enugu State University of Science and Technology, PMB 01660. Agbani, Enugu State, Nigeria, jonalbval020@gmail.com

Introduction

The contribution of economic liberalisation to the growth of an economy has been a subject of debate over the years. While some scholars are of the view that through economic liberalisation, a country's economy can be improved (Wei, 2015), others are sceptical about the growth-led hypothesis of openness of the economy. Concerns have been raised about the impact of openness of the economy on developing countries that depend mostly on the export of primary products in relation to developed countries, whose export products comprise mostly manufactured goods. This concern was earlier raised by Prebisch (1950) and Singer (1950) in their separate studies. These scholars noted that trade between developing and developed countries usually does not favour the former because of their specialisation in the export of primary products which suffer deteriorating terms of trade. Additionally, the role of institutions in influencing the economy has been identified. Equally, there is yet a consensus on the actual impact of institutions on the performance of the economy. While some scholars such as (Ha, 2016; Ngo & Nguyen, 2020; North, 1990) contended that institutional quality supports growth, others—such as Acemoglu et al. (2015)—found no significant link between institutional variables and the growth of the economy.

In the face of these controversies, the focus of this study is to contribute to the on-going debate by concentrating on some selected countries within the Economic Community of West African States (ECOWAS). In 1975, the ECOWAS was established as a regional and economic bloc with the objectives, which include the promotion of economic integration and the creation of a single large trading bloc. ECOWAS is composed of 15 member countries, including among others Nigeria, Togo, Ghana, Sierra Leone, Liberia, Gambia, Benin, Senegal and Ivory Coast. This study focuses on five ECOWAS countries, namely: Nigeria, Ivory Coast, Togo, Benin and Senegal. Endowed with an abundance of natural resources such as: crude oil, gas, zinc, lead, coal, limestone and so on, Nigeria is among the biggest economies in ECOWAS. Even with the abundance of these resources, its mainstay is revenue from crude oil, which contributes largely to its gross domestic product (GDP). Senegal is endowed with natural resources such as: phosphates, gas, gold, iron and recent oil discoveries. In Senegal, rural employment comprises activities in mining, fishing and agriculture. The bulk of foreign exchange earnings in Togo come mainly from the export of cotton, coffee and cocoa. In addition to these, the country is also endowed with limestone, marble and phosphates. For Benin, its major source of foreign exchange is cotton, while subsistence farming remains its economic mainstay. More so, it engages in the production of palm products, beans, rice, yams, peanuts, etc. Ivory Coast major export goods are: palm oil, coffee, rubber, pineapples and cocoa. It also has offshore oil and gas. Ivory Coast has a relatively high standard of living in West Africa with the growing middle class.

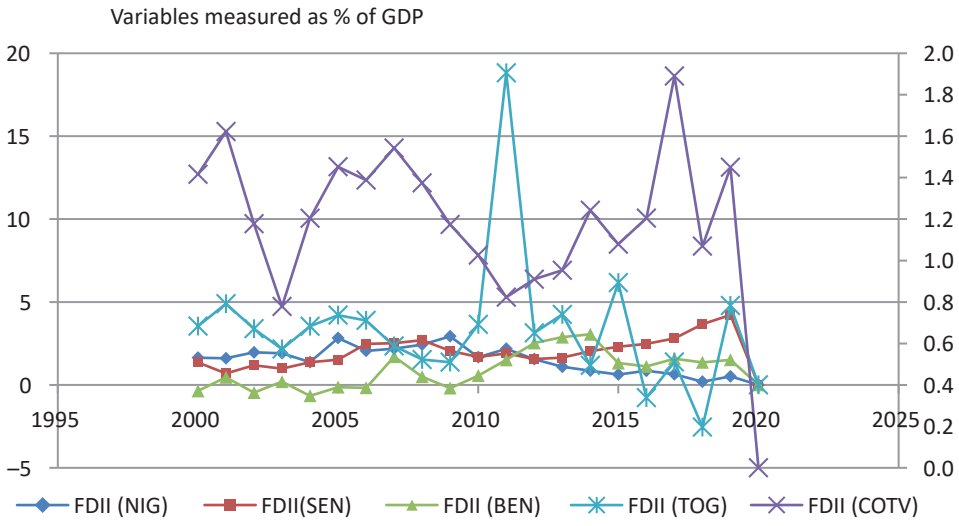
The interest in ECOWAS stems from to the fact that the countries comprising the bloc fall under developing countries that specialise mostly in the export of primary products amid poor institutional arrangements. As a result, the economy of these countries usually suffers from deteriorating terms of trade, which amounts to revenue shocks. More worrisome is the fact that these countries are beset by weak and ineffective institutions that inhibit their growth process. It is our conviction that the outcome of the findings will be of interest to policy makers in these and other developing countries since, according to our best knowledge, no such study has been conducted in the economic bloc. Our study is thus guided by the null hypothesis that economic openness and institutional quality do not have any significant impact on the GDP *per capita* both in the long run and in the short run.

Section 1 of the study deals with introduction and annual changes in some variables used in the study and Section 2 treats the theoretical issues linking both openness of the economy and institutional quality to GDP *per capita*. Subsections 2.1 and 2.2 deal with empirical literature, while Section 3 deals with the methodology. The focus of Sub-sections 3.1 and 3.2 is on model specification as well as data and variables respectively. In Section 4, the study analyses the results and interpretations, while the last section provides the conclusion of the study.

1. Annual changes in FDII, FDIO, regulatory quality and political stability

We provide the annual changes in some of the variables used in the study, such as foreign direct investment inflows (FDII), foreign direct investment outflows (FDIO), regulatory requirement and political stability. In terms of FDI inflows, Figure 1 indicates that Ivory Coast was a major destination of FDI inflows from 2000 through 2010. However, in 2011 FDI inflows for Togo were the highest even though this did not last as the value descended abruptly the same year. Beginning from 2012, Ivory Coast's FDI inflows were higher than those of other countries all through the sample period. Senegal was another country that had a mild rise in its FDI inflows, followed by Benin. The changes for Nigeria were not noticeable throughout the sample period. It is our view that the conducive and friendly macroeconomic environment coupled with the absence of bottlenecks on capital movement could be responsible for the rise in the FDI inflows. For instance, the economy of Ivory Coast has been stable over the years as the country has a relatively high standard of living.

With respect to FDI outflows, evidence in Figure 2 indicates that FDI outflows were highest for Senegal from 2000 to 2009. FDI outflows for Togo were the highest only in 2011 and in 2016, while the value for Senegal was highest in 2016. The



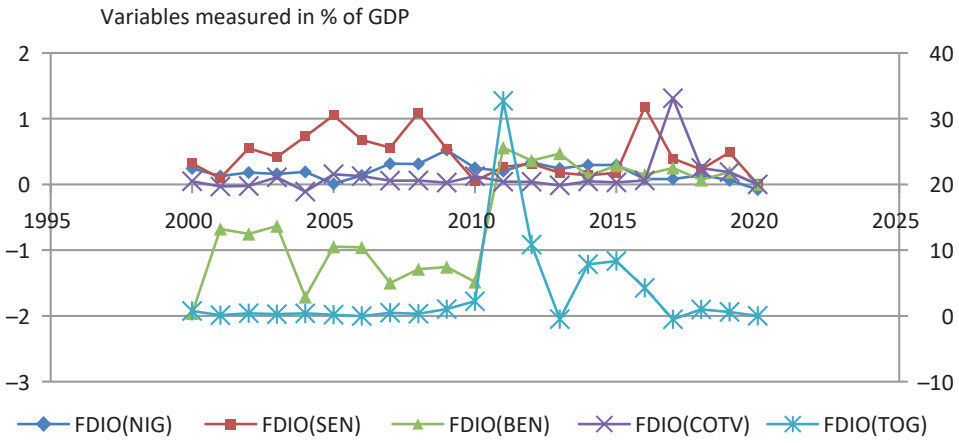
Note: FDII – foreign direct investment inflows, NIG – Nigeria, SEN – Senegal. BEN – Benin, COTV – Ivory Coast, TOG – Togo.

Figure 1. Annual changes in FDI inflows in selected ECOWAS countries

Source: own compilation.

value for Ivory Coast was highest in 2017. Between 2000 and 2009 also Nigeria's FDI outflows trailed behind Senegal but became almost flat after 2009. The value for Benin was negative from 2000 to 2011 but was flat from 2012. Additionally, with the exception of 2012 when the value for Togo was the highest, the value for other years was negative. One noticeable factor is that the countries that had high FDI inflows also had low FDI outflows. For instance, Ivory Coast whose value of FDI inflows was very high during the study period had a very low FDI outflows. The same goes for Togo whose FDI outflows were negative in almost the entire sample period. It is equally noticed that Senegal, whose value of FDI inflows was flat all throughout the sample period, had the highest value of FDI outflows.

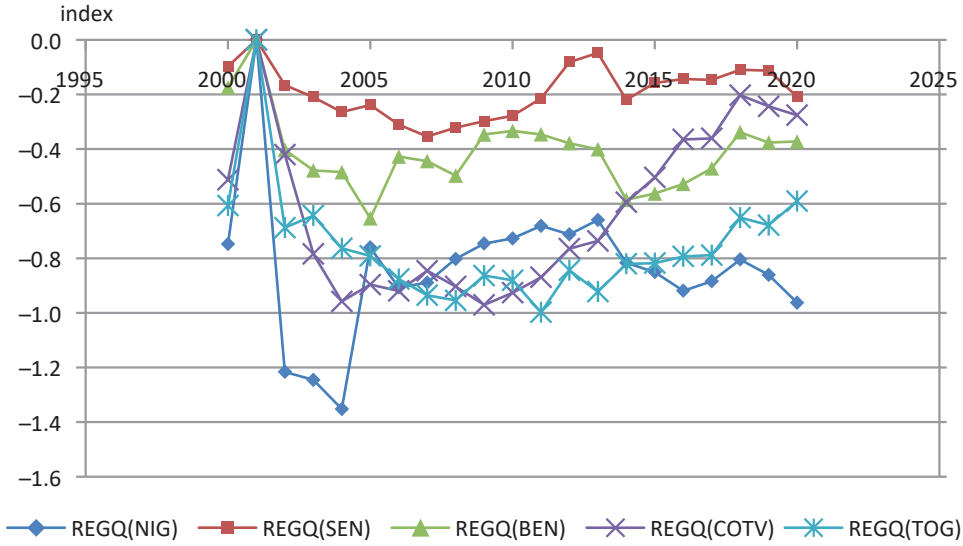
Annual changes in the regulatory quality in Figure 3 show that in 2001 all the countries in the sample attained a slight improvement in their regulatory quality, but it quickly descended to negative, except for Senegal whose regulatory quality was negative from 2003. From 2011, regulatory quality for Senegal turned positive and it remained so all throughout the sample period. Apart from Senegal, the value for other countries was negative in the entire study period, except in 2001. The implication of this finding is that the countries sampled in this study had weak regulatory quality, and this is inimical to growth. Weak regulatory quality hampers the growth of the economy as it introduces rigidities in the macroeconomic environment.



Note: FDIO – foreign direct investment outflow, NIG – Nigeria, SEN – Senegal, BEN – Benin, COTV – Ivory Coast, TOG – Togo.

Figure 2. Annual changes in FDI outflows in selected ECOWAS countries

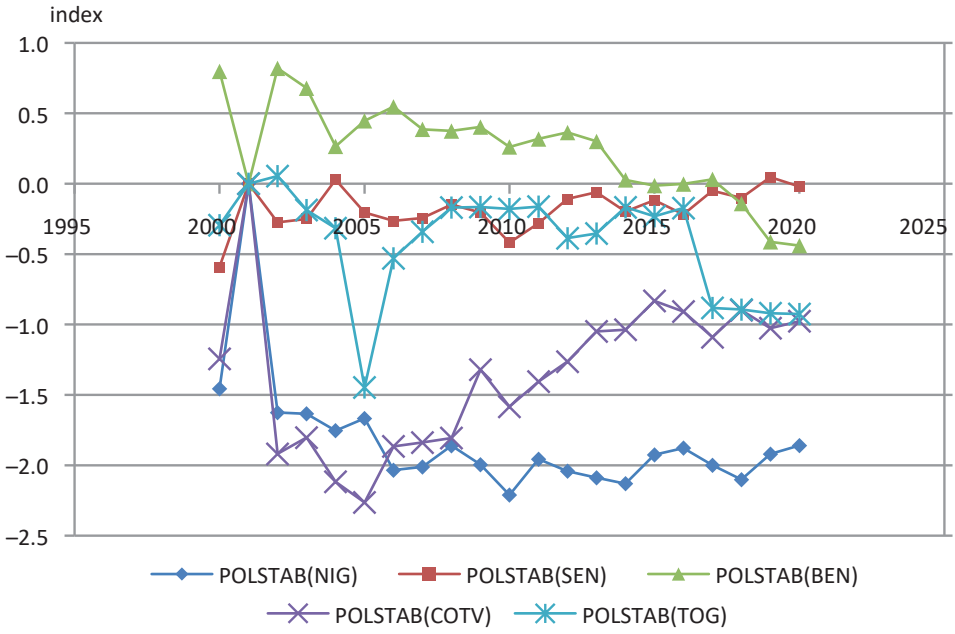
Source: own compilation.



Note: REGQ – regulatory quality, NIG – Nigeria, SEN – Senegal, BEN – Benin, COTV – Ivory Coast, TOG – Togo.

Figure 3. Annual changes in regulatory quality in selected ECOWAS countries

Source: own compilation.



Note: POLSTAB – political stability, NIG – Nigeria, SEN – Senegal, BEN – Benin, COTV – Ivory Coast, TOG – Togo.

Figure 4. Annual changes in political stability in selected ECOWAS countries

Source: own compilation.

In Figure 4, it can be seen that political stability in all the countries was positive in 2001. The value for Benin was positive until 2017 when it descended to negative. On the other hand, Senegal had a positive value in 2004, 2012 and 2019 respectively, while the value for other years was negative. Togo had a positive value only in 2002, but the value for other years was negative. Apart from 2001, the values for Ivory Coast, Nigeria and Togo were never positive throughout the sample period. Again, this shows that the economic growth prospect of the countries in our sample could be affected by political instability that beset them.

2. Theoretical issues

Diverse theoretical views have been raised regarding the connection between economic openness and the performance of the economy. Lucas (1988) observed that as a country liberalises its trade through opening up its borders, there are

chances that the country will benefit from technological diffusion from developed countries. Furthermore, Grossman and Helpman (1991) were of the view that the spillover arising from foreign direct investment (FDI) by means of the transfer of technology and diffusion of knowledge could translate into improved productivity, and hence economic growth. Trade openness encourages specialisation, enhances domestic productivity and economies of scale and all these lead to the growth of the economy. In addition to these, by encouraging competition, domestic producers are conscious of their production processes and have the tendency to improve efficiency, thus reducing the cost of doing business. However, despite the growth-led hypothesis of economic openness, some scholars are of the view that opening up the economy could result into reduced growth. Diakosavvas and Scandizzo (1991) argued that terms of trade of a country are bound to decline if the country's export demand is elastic. This view finds support in Krugman (1994) who observed that the impact of economic openness on economic growth is not clear. Krugman (1994) argued that terms of trade of a country are bound to deteriorate if domestic consumption of imported goods is higher than domestic production of these goods.

The growth-led hypothesis of institutional quality has also been buttressed by some scholars. North (1990) contended that institutions play an essential role in enhancing the growth of the economy. Institutional quality variables such as governance effectiveness, regulatory quality, voice and accountability, etc. are germane to the growth of a country's economy. Supporting this, Rodrik (1999) observed that institutional quality enhances the long-term economic growth of a country. Institutional quality transmits to the economy through its effects on the variables that improve economic growth. Effective institutions lead to reduction in transaction costs, which subsequently impacts investment positively. As noted by Aron (2000), quality investments can be achieved in countries that have effective and functional institutions. For instance, if property rights are weakly defined and lack enforcement in a country, huge and profitable investments in fixed assets may not penetrate the country as the state could seize the profits arising from the investment.

2.1. Empirical literature on the link between economic openness and GDP

Several empirical studies have been carried out to investigate the nexus between openness of the economy and economic growth across different countries. In a study for Nigeria, Saifullahi and Nuruddeen (2015), using the vector error correction model (VECM) and Granger causality test over a period of 1980–2012, revealed that the link between real GDP and trade openness is positive, while a negative relationship exists between real GDP and financial openness. Wei (2015)

employed both *de jure* and *de facto* indicators of financial openness in seventeen Asian countries to prove that *de facto* indicators facilitated growth but de jure indicators did not. In China, Quazi et al. (2016) used the framework of ARDL to show that trade openness is positively related to economic growth both in the long run and in the short run. In a cross-country study involving sub-Saharan African (SSA) countries, Mputu (2016) employed the frameworks of fixed and random effects over a period of 1980–2011 to reveal that the link between terms of trade and GDP is positive. In a study comprising 125 countries, of which 37 are least developed countries (LDCs), Brun and Gnangnon (2017) used three stage least squares (3SLS) to show that trade openness drives financial flows for development in addition to improving government public revenue**.**

Huchet et al. (2018) used the generalised method of moments (GMM) estimator in a panel of 169 countries over a period of 1988–2014 to prove that openness to trade may impact growth negatively for countries which specialise in low quality products. In a study involving Ghana, Nigeria and South Africa, Ehigiamusoe and Hooi Hooi (2018) employed the ARDL framework to show that interdependence exists among financial development, trade openness and economic growth. Goh et al. (2019) employed an unbalanced panel data of 115 countries spanning between 1970 and 2014 to show that a two-way causality exists between *de facto* financial openness and trade openness. In a study involving developed and developing countries, Fatima et al. (2020) used the GMM to reveal that an indirect link exists between trade openness and GDP growth. In a cross-country study involving West African countries, Wiredu et al. (2020) used static panel regression techniques to show that trade openness, investment and inflation had a positive and significant impact on economic growth. In another study for Nigeria, Obiakor et al. (2021) applied the ARDL to prove that trade openness did not have a significant effect on government spending in the short run. The result of the nexus between trade openness and GDP contradicts the findings by Saifullahi and Nuruddeen (2015). By focusing on the link between trade openness and foreign direct investment, Rathnayaka Mudiyanselage et al. (2021) employed the ARDL over a period of 1997–2019 to show that trade openness had negative and significant long-run and short-run relationships with FDI inflows in Romania.

2.2. Empirical literature on the link between institutional quality and GDP

Some studies have revealed that institutional qualities are important indicators of economic performance. Le et al. (2015) applied the GMM over a period of 1995–2011 to show that better governance and institutional quality encouraged

financial development in developing countries, while economic growth and trade openness were the major determinants of financial depth in developed economies. For 29 emerging economies, Nguyen et al. (2018) used the system generalised method of moments (SGMM) estimators over a period of 2002–2015 to indicate that institutional quality exerted a significant and positive impact on economic growth. In a cross-country study involving middle-income countries, Recuero and González (2019) used the framework of a panel vector autoregressive (PVAR) model to reveal that institutional quality and economic growth are positively related. In a study for Nigeria, Olanrewaju et al. (2019) used Toda-Yamamoto (TY) Granger non-causality test within the framework of augmented VAR to examine the causal link among institutional, financial and economic growth over 1998–2017. The results show that all the variables, except for the financial inclusion index caused growth but without any evidence of feedback. For Asian countries, Ngo and Nguyen (2020) used the GMM over a period of 2000–2018 to show that institutional factors did not have a positive impact on economic growth in middle income countries in Asia. In another study for Nigeria, Abubakar (2020) employed the ordinary least squares (OLS) method over a period of 1979–2018 to show that economic growth responded positively to institutional quality. Abere and Akinbobola **(**2020) employed the structural vector autoregressive (SVAR) approach to show that the role of institutional quality is important in the performance of the macroeconomic environment in Nigeria. Oanh et al. (2021) used quintile regression methods in a study involving 48 countries in Asia for a period of 2005–2018 to prove that an institutional threshold exists for economic growth to reach its highest level. The authors of the study observed that if an indicator for the institution exceeds the threshold, economic growth declines. Wang et al. (2021) employed the fully modified ordinary least squares (FMOLS) method and VECM for a period of 1999–2017 to show that institutional quality significantly promoted economic growth in non-oil producing countries, but showed no significant impact in oil-producing countries.

3. Methodology

In this study, the authors have employed the framework of the panel autoregressive distributed lag (ARDL) to investigate the impact of economic openness and institutional quality on the economic performance in the ECOWAS. The strength of the ARDL over other methods is that it can be applied notwithstanding the presence of endogeneity of the variables of the model. Additionally, it can be employed irrespective of whether the series are integrated of order one

I(1) or zero *I*(0) or an admixture of *I*(1) and *I*(0). In order to check the order of integration, we employed panel unit root tests such as: Levin, Lin & Chu (LLC), which tests for the existence of a unit root for all the countries pooled together, Augmented Dickey Fuller-Fisher (ADF-Fisher), Im, Pesaran and Shin (IPS), as well as Phillp-Perron-Fisher (PP-Fisher) tests which test the null hypothesis of the existence of a unit root for individual countries. Having ascertained the order of integration, the study investigated the presence of long-run relationship using both the Kao residual cointegration and the Johansen Fisher panel cointegration test. The study combined both institutional qualities and openness of the economy following Rajan and Zingales (2003), who noted that a simultaneous combination of the two determinants could guarantee economic growth. After ascertaining the cointegrating relationship, the study went further to investigate both the long-run and the short-run impact.

3.1. Model specification

With respect to the theoretical views that link institutional quality and economic openness to economic growth, the functional relationship among these variables is stated in Equation (1) as follows:

$$LGDPPC_t = f(FDII_t, FDIO_t, POLSTAB_t, REGQ_r, TOPEN_t, LBNT_r) \tag{1}$$

The panel ARDL representation of Equation (1) can be expressed as follows:

$$\begin{aligned}\Delta LGDPPC_{it} = {} & \lambda_0 + \sum_{i-1}^{p} \lambda_1 \Delta LGDPPC_{it-i} + \sum_{t=0}^{p} \lambda_2 \Delta FDII_{it-1} + \\ & + \sum_{t=0}^{p} \lambda_3 \Delta FDIO_{it-i} + \sum_{t=0}^{P} \lambda_4 \Delta POLSTAB_{it-i} + \sum_{t=0}^{p} \lambda_5 \Delta REGQ_{it-i} + \\ & + \sum_{t=0}^{p} \lambda_6 \Delta TOPEN_{it-i} + \sum_{t=0}^{p} \lambda_7 \Delta LNBT_{it-i} + \lambda_8 LGDP_{it-1} + \lambda_9 FDII_{it-1} + \\ & + \lambda_{10} FDIO_{it-1} + \lambda_{11} POLSTAB_{it-1} + \lambda_{12} REGQ_{it-1} + \lambda_{13} TOPEN_{it-1} + \\ & + \lambda_{14} LNBT_{it-1+} \varepsilon_{it}\end{aligned} \tag{2}$$

where: $LGDPPC$ is log of Gross Domestic *per capita* (a proxy for economic growth); $FDII$ is foreign direct investment inflows; $FDIO$ is foreign direct investment outflows; $POLSTAB$ is political stability; $REGQ$ is regulatory quality; $TOPEN$ is trade openness; $LNBT$ is log of net barter terms of trade; ε is the error term.

The country and time are represented by the subscripts i and t respectively in Equation (2), λ_1, λ_2, λ_3, λ_4, λ_5, λ_6 and λ_7 are the coefficients of the short-run parameters, while λ_8. λ_9, λ_{10}, λ_{11}, λ_{12}, λ_{13} and λ_{14} are the coefficients of the long-run parameters.

The hypotheses are stated as follows:

$\lambda_8 = \lambda_9 = \lambda_{10} = \lambda_{11} = \lambda_{12} = \lambda_{13} = \lambda_{14} = 0$ (existence of cointegration)

$\lambda_8 \neq \lambda_9 \neq \lambda_{10} \neq \lambda_{11} \neq \lambda_{12} \neq \lambda_{13} \neq \lambda_{14} \neq 0$ (absence of cointegration)

3.2. Data and variables

In this study, the interest is to investigate the impact of openness of the economy and institutional quality on the economic performance of the ECOWAS over a period of 2000–2020. The countries comprising the ECOWAS that are featured in the study include: Nigeria, Senegal, Benin, Ivory Coast and Togo and they have been selected based on data availability. The data for the variables were obtained from the World Development Indicators (WDI) data bank, except data on institutional quality variables that were obtained from the Worldwide Governance Indicators (WGI). GDP *per capita* (GDPPC) is used to measure economic performance and it is measured in constant 2015 US dollars for all the countries, except for Nigeria whose GDP *per capita* is measured in constant 2010 US dollars. GDP *per capita* is calculated by dividing real GDP by the population of a given country. Net barter terms of trade (NEBT) are used as a proxy for terms of trade and they are measured using 2000 as the base year for all the countries in the sample. The institutional quality variables used in the study are political stability and regulatory quality. The authors divide openness of the economy into trade openness and financial openness. Trade openness is calculated as the ratio of the sum of export and import to GDP (Das & Rishi, 2010; Nzeh et al., 2021; Obiakor et al., 2021). The GDP used in calculating trade openness is measured in constant 2015 US dollars for all the countries, except for Nigeria whose GDP is measured in constant 2010 US dollars. Additionally, apart from Nigeria whose export and import are measured in 2010 constant US dollars, other countries' export and import is measured in 2015 constant US dollars. We used *de facto* indicators to capture financial openness, namely: foreign direct investment inflows (FDII) and foreign direct investment outflows (FDIO) and they are all measured as a percentage of GDP. The main reason for the study's adoption of FDI flows as a proxy for financial openness is that they are considered the main source of foreign investors' external capital for domestic companies. The choice of FDI inflows and outflows find support in Wei (2015) and Goh et al. (2019).

4. Results and interpretations

In every time series study, carrying out a preliminary test to determine the stationarity of the series is paramount to avoid generating results that are not relevant. In this study, we conducted various panel unit root tests to determine the order of integration of the series. Such tests in retrospect include the Levin, Lin and Chu (LLC), Im, Pesaran and Shin (IPS), Augmented Dickey-Fuller-Fisher (ADF-Fisher) and Phillip Perron-Fisher (PP-Fisher) unit root tests. The decision rule is to reject the null hypothesis of no stationarity if the *p*-value of each test is less than the chosen critical values. If that is the case, we conclude that the series are stationary or that there is no presence of a unit root. The results of the LLC test presented in Table 1 show that FDII, FDIO, POLSTAB and REGQ achieved stationarity at level, that is they were *I*(0). However, after the first difference, as indicated in Table 2, all the series became stationary; that is, they became *I*(1) with the exception of REGQ which remained *I*(0). Under the IPS test presented in Table 1, FDIO, POLSTAB and REGQ were *I*(0); however, as shown in Table 2, all the series became *I*(1) after the first difference. Furthermore, in Table 1 FDIO, POLSTAB and REGQ were *I*(0) under the ADF-Fisher test but the series became *I*(1) after the first difference, as indicated in Table 2. Under the PP-Fisher test, FDII, FDIO, POLSTAB and REGQ were *I*(0), as shown in Table 1, but the information in Table 2 indicates that all the series became *I*(1) after the first difference. The fact that the unit root tests indicate that the series have an admixture of *I*(0) and (1) implies that the ARDL framework can be employed in the study.

Having ascertained that the series are stationary, the study investigated the long-run relationship among the variables to check if a long-run association exists among the variables. We used both the Kao residual panel cointegration test and

Table 1. Panel unit root at level for the ECOWAS countries

	Common unit root	Individual unit root		
Variable	**LLC**	**IPS**	**ADF-Fisher**	**PP-Fisher**
LGDPPC	–0.70 (0.24)	1.61 (0.94)	8.95 (0.53)	9.43 (0.49)
FDII	–2.19 (0.01)*	–0.64 (0.25)	13.28 (0.20)	23.40 (0.009)*
FDIO	–1.46 (0.07)**	–1.57 (0.05)*	17.08 (0.07)**	28.90 (0.00)*
LNBT	1.20 (0.88)	1.19 (0.88)	4.68 (0.91)	11.90 (0.28)
TOPEN	1.20 (0.88)	1.26 (0.89)	3.64 (0.96)	5.20 (0.87)
REGQ	–4.84 (0.00)*	–5.29 (0.00)*	46.30 (0.00)*	21.40 (0.01)*
POLSTAB	–7.59 (0.00)*	–3.58 (0.00)*	42.40 (0.00)*	31.70 (0.00)*

Note: *, ** represent 5 and 10 percent level of significance respectively.

Source: own compilation.

Table 2. Panel unit root at first difference for the ECOWAS countries

	Common unit root	Individual unit root		
Variable	**LLC**	**IPS**	**ADF-Fisher**	**PP-Fisher**
ΔLGDPPC	2.02 (0.02)*	–1.89 (0.02)*	19.6 (0.03)*	20.5 (0.02)*
ΔFDII	–7.07 (0.00)*	–3.56 (0.00)*	31.3 (0.00)*	292.4 (0.00)*
ΔFDIO	–6.52 (0.00)*	–6.53 (0.00)*	56.3 (0.00)*	161.0 (0.00)*
ΔLNBT	–5.66 (0.00)*	–2.08 (0.01)*	25.1 (0.00)*	63.1 (0.00)*
ΔTOPEN	–1.81 (0.03)*	–3.10 (0.00)*	27.3 (0.00)*	61.3 (0.00)*
ΔREGQ	0.22 (0.59)	–4.82 (0.00)*	41.2 (0.00)*	96.2 (0.00)*
ΔPOLSTAB	–5.17 (0.00)*	–9.17 (0.00)*	81.9 (0.00)*	373.4 (0.00)*

Note: * represent 5 level of significance respectively.

Source: own compilation.

the Johansen Fisher panel cointegration test in this study. The decision rule under the Kao test is to reject the null hypothesis of no cointegration if the *p*-value of the residual is less than the 5% level of significance. Following the results in Table 3, the *p*-value of the residual at 0.0000 is less than 5%, thus suggesting that a cointegration exists among the series. The results of the Johansen Fisher cointegration test support the Kao cointegration test. As shown in Table 4, the Johansen-Fisher test indicates that both the Trace and Max-Eigenvalue tests have a *p*-value that is less than the 0.05 at all the levels, thus confirming the existence of a long-run relationship among the series.

Table 3. Kao residual cointegrationt Test for the ECOWAS countries

Series: LGDP FDII FDIO LNBT POLSTAB REGQ TOPEN Sample: 2000 2020 Included observations: 105 Null Hypothesis: No cointegration				
Variable	**Coefficient**	**Std. error**	***t*-statistic**	**Prob.**
RESID(–1)	–0.346288	0.077454	–4.470908	0.0000

Source: own compilation.

Table 5 shows the short-run results of the ARDL for the ECOWAS bloc. The short-run results show that FDI inflows had a positive influence on the GDP *per capita*, but the outcome is not significant. However, the results of FDI outflows indicated a significant and negative impact on the GDP *per capita*. One unit increase in FDI outflows led to a fall in the GDP *per capita* by 0.003%. FDI outflows represent a diversion of resources out of the domestic economy. This implies that when these resources leave the shores of the country, the domestic economy is deprived of

Table 4. Johansen Fisher panel cointegration test for the ECOWAS countries

Unrestricted cointegration rank test (trace and maximum eigenvalue)				
Hypothesized No. of CE(s)	**Fisher stat. (from trace test)**	**Prob.**	**Fisher stat. (from max-eigen test)**	**Prob.**
None	6.931	0.731	6.931	0.731
At most 1	4.159	0.939	41.000	0.000
At most 2	73.680	0.000	92.100	0.000
At most 3	175.600	0.000	132.400	0.000
At most 4	80.610	0.000	55.770	0.000
At most 5	37.860	0.000	29.560	0.001
At most 6	27.720	0.002	27.720	0.002

Source: own compilation.

Table 5. Panel ARDL results for the ECOWAS countries – short-run results

Variable	**Coefficient**	**Std. error**	***t*-statistic**	**Prob.**
ΔFDII	0.003	0.003	1.12	0.260
ΔFDIO	–0.003	0.001	–3.10	0.002
ΔLNBT	0.020	0.020	0.92	0.360
ΔTOPEN	–0.030	0.050	–0.59	0.550
ΔREGQ	–0.010	0.008	–1.30	0.190
ΔPOLSTAB	0.006	0.005	1.31	0.190

Source: own compilation.

the opportunity to use them for improving the economy. The only way in which FDI outflows can benefit the economy is when the proceeds of the investment are repatriated to the domestic economy. Furthermore, it is noticed that while terms of trade and political stability had a positive but non-significant impact on the GDP *per capita*, trade openness and regulatory requirement had a negative but non-significant impact on the GDP *per capita*.

As shown in Table 6, while FDI inflows had a positive but non-significant impact on the GDP *per capita* in the long run, the impact of FDI outflows was found to be negative but non-significant. The terms of trade were found to have a positive impact on the GDP *per capita*, even though the result was not significant, while the impact of trade openness was negative and significant. The result for trade openness indicate that one unit rise in trade openness resulted in improvement in GDP *per capita* by 0.20%. The economy of ECOWAS countries is mainly propelled by the export of primary products that compete unfavourably with the products of advanced economies. Therefore, opening up the economy of these

Table 6. Panel ARDL results for the ECOWAS countries – long-run results

Variable	Coefficient	Std. Error	*t*-statistic	Prob.
FDII	0.009	0.006	1.62	0.10
FDIO	–0.006	0.004	–1.42	0.15
LNBT	0.040	0.020	1.66	0.10
TOPEN	–0.200	0.030	–5.56	0.00
REGQ	0.070	0.010	5.40	0.00
POLSTAB	–0.130	0.010	–11.70	0.00
C	0.030	0.280	0.12	0.89

Source: own compilation.

countries could hurt them. The results of the two institutional quality variables indicate that, while political stability had a negative impact on the GDP *per capita*, the impact of regulatory requirement was positive.

Conclusions

In this study, we investigated the impact of openness of the economy and institutional quality on the economic performance of the ECOWAS using the panel ARDL with annual series covering a period from 2000 to 2020. The findings show that in the short run, regulatory requirement adversely affected the economic performance of the ECOWAS bloc. Additionally, FDI outflows had a negative impact on the performance of the economy of the ECOWAS bloc. The long-run results indicated that trade openness, FDI outflows and political stability adversely affected the economy of the ECOWAS bloc, while regulatory requirement influenced the economy positively. The long-run result of the impact of trade openness is a contradiction from the results of Wiredu et al. (2020) in a study comprising West African countries. The implication of the result is that, while it is necessary to attract FDI inflows to the ECOWAS bloc, opening up trade could hurt the economies of these countries because the countries comprising the bloc are mainly primary export producers whose products do not compete favourably with the products of developed economies. That is why, we recommend that the ECOWAS countries should introduce measures to attract more FDI, while stabilising their economies to discourage FDI outflows. Additionally, trade should mainly be carried out within the member countries and other developing countries to avoid experiencing adverse terms of trade. This calls for strong regulatory framework in the short and medium term and building a strong and stable political environ-

ment in the long term. A major limitation of the study is the inability to factor in the impact of capital controls on the GDP *per capita*. This is necessary considering that countries in ECOWAS adopt some capital control measures that restrict the penetration of capital into their economies. This could take the form of exchange rate or interest rate policies. Therefore, future studies should endeavour to include capital controls in a similar study, which entails employing appropriate proxies for capital control.

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Application of the vector-autoregression VAR model in the analysis of unemployment hysteresis in the context of Okun's Law

Patryk Kołbyko[1]

Abstract

Unemployment is an important macroeconomic issue both in theoretical terms and for economic reality. On the theoretical ground, the unemployment rate, which is a measure of the share of unemployed units of the labour supply in the economy, determines the output gap at a certain adjustment parameter determined by the marginal productivity of labour. One of the causes of rising or persistent unemployment in the economy is the phenomenon of unemployment hysteresis, which occurs as a result of changes in the marginal disutility of labour, the strength of the wage bargain and other exogenous conditions arising in previous periods. The purpose of the study conducted in the following paper is to investigate the phenomenon of hysteresis in the labour market by analysing the significance of the impact of the unemployment rate in previous periods. In addition, the work aims to study Okun's Law as an effect of production dynamics on the unemployment rate. The study of the dependence was carried out through the estimation of a macroeconometric time series model—vector-autoregression (VAR) on the example of statistical data for Poland obtained from Statistics Poland (Stat.gov.pl) and complied raports about national accounts in the quarterly sequence for the years 2015–2021. The period of the study was

Keywords

- vector-autoregression model VAR
- time series analysis
- hysteresis in the labour market
- Okun's Law
- macroeconometrics

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[1] University of Maria Curie-Skłodowska in Lublin, pl. Marii Curie-Skłodowskiej 5, 20-400 Lublin, Poland, patryk.kolbyko2000@gmail.com

arbitrarily selected with the observation of business cycle fluctuations in the above time frame. Empirical analysis of selected structural parameters through estimation of the vector-autoregression model showed a significant influence of the time series in the formation of the unemployment rate, which confirms the influence of the analysed phenomenon of hysteresis in the labour market. In addition, the vector-autoregression model for interval forecasting through the use of dynamic prediction proved to be a posteriori accurate forecasting model of the unemployment rate in the Polish economy.

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Introduction

In the literature of economic theory, there are many concepts from other sciences that have been implemented for the purpose of describing phenomena, which by the keen observation of researchers have been formulated to detail a certain mechanism occurring in economic life. Many economic methodologists to this day argue about the validity of using certain tools of methodology to study certain phenomena; some use tools specific to the methodological field of positive economics (Friedman, 1966), that is, the use of estimation by quantitative methods and stochastic processes to objectively evaluate economic phenomena; others use broad description using deductive or inductive approaches, and still others synthesise the above methods taking into account certain normative assumptions *a priori* or *a posteriori* using non-linear models. One phenomenon that has attracted the attention of a wide range of empirical researchers and macroeconomists since the second half of the 20th century is unemployment hysteresis. The concept of hysteresis, which derives its name from the Greek *hústeros* ("to lag behind") was originally coined by Scottish physicist Alfred James Ewing, who used the term hysteresis to describe the permanent effect of the temporary influence of ferrous metals on magnetic fields. A general description of the phenomenon of hysteresis was formulated more broadly within the framework of systems theory by Mark Krasnoselsky and Alexei Pokrovskii in *Systems with hysteresis* (Cross et al., 2005), who pointed out the nonlinearity in the way elements respond to changes in the system. In line with the above, the phenomenon of hysteresis is also a platform for research in chaos theory, where hysteresis can have a significant impact on fluctuations in the limit cycle (Cavallo et al., 2005) as the equilibrium point to which the system is moving while in transition. More widely echoed

in economic theory was Pokrovskii, who analysed business cycles with reference to Preisach's hysteresis model (Mc Namara & Pokrovskii, 2006) as an implication to Kaldor's (1940) endogenous limit cycle model. In terms of endogenous growth models, which take into account the problem of quantity adjustment that is an implication of the acceleration mechanism (Clark, 1917) in the form of lags between the supply of capital goods and gross accumulation and investment spending and the marginal efficiency of capital, time is an important factor that determines the volume of the dependent variable under study in the future period. An example of a theoretical growth model that uses the acceleration mechanism of the acceleration rule in the time interval of the dependent variable under study is the endogenous Samuelson-Hicks model (Bohner et al., 2010). In the "static" understanding of economic mechanisms, hysteresis is a phenomenon resulting from external factors such as psychology, which is revealed when the change in the reservation wage (Karunaratne, 1995) is determined by the marginal disutility of labour. A change in the psychology of workers, a change in labour laws, the strength of union labour bargaining and minimum wages are exogenous factors that determine the rate of structural unemployment over a certain time period (Guichard & Rusticelii, 2010), where the economic sense of the unemployment hysteresis phenomenon is revealed. Another example of the hysteresis phenomenon is when the employment status of workers is determined by the bargaining power over the wages of currently employed workers, who determine the propensity of the private sector to hire workers at set wages, where in the time interval studied by the influence of an external factor, the unemployment rate is formed, such a hysteresis phenomenon is referred to as "insider-outsider" (Gali, 2020; Grinfeld et al., 2009).

Okun's law, which is a rule that was originally derived from the statistical relationship between the unemployment rate and the output gap, which was estimated by A. Okun (1962), is also the subject of research into the relationship between the unemployment rate and output dynamics. The above law in terms of the new neoclassical synthesis takes into account in its analysis the natural unemployment rate and the adjustment parameter determined by the marginal productivity of labour as the ratio of the growth of labour product to the growth of employed labour factors calculated in wage units. In practice, however, with a mesocurtic (Batóg & Batóg, 2012) distribution of marginal workers' labour product (productivity), marginal labour productivity must exhibit a value greater than zero. This is due to the fact that each employed labour factor at a given disutility of labour shows a certain marginal product of labour (Zwiech, 2013) under conditions of output gap. Of course, under conditions of inflationary disequilibrium caused by the impact of the income effect, for example, under the fiscal stimulus applied or the overestimated level of the marginal efficiency of capital, will actually cause a non-linear price increase under price adjustment, but also at a much

slower rate of quantity adjustment resulting from the principle of capital adjustment. Okun's work, which is an empirical analysis, showed—using US statistics as an example—a relationship in which a 1% change in output dynamics determined a 0.3 p.p. change in the unemployment rate. By many researchers, the above relationship with the confidence interval taken into account has been empirically confirmed on the example of other economies (Lee & Huruta, 2019), sometimes examining the above relationship with extended vector-autoregression models (Pata et al., 2018).

The purpose of the study discussed in the paper is to analyse the relationship between the unemployment rate in the Polish economy and the time series and production dynamics using the estimation of a macroeconometric vector-autoregression VAR model. The work is designed to demonstrate the existence of the phenomenon of hysteresis in the labour market through the relevance of the impact of the state of employment in the studied time series and the relationship derived from the economic theory of Okun's Law. In addition, in order to empirically verify the VAR model, a static forecast was carried out for the estimated trend model used in the dynamic forecast of the vector-autoregression model to show "drift" in random straying of hysteresis phenomenon. The methodology used in the paper applies the stochastic approach within the positive field of economics to reliably estimate and objectively draw conclusions from the analysis while synthesising the inductive approach characteristic of the normative field of economics, where economic theory is relegated to the role of a "scenery" used to describe empirical research, and the estimated model was drawn up by meeting assumptions about the reliability of model verification and the optimal choice of structural parameters and their lags. One of the precursors of this approach was the American representative of institutionalism Wesley Mitchell (Rutherford, 1987). The compiled data on quarterly unemployment rate and production dynamics for empirical estimation are secondary data obtained from the compiled report for Statistics Poland on the national accounts in 2015–2021 (Jeznach, 2017; Perzyna, 2022).

1. Literature review

The vector-autoregressive VAR model developed and proposed by C. A. Sims in 1980 in his work Macroeconomics and Reality provides an alternative macroeconometric model to the multilinear models, the fundamentals of construction and estimation of which were presented by the Cowles Commission. Multiequation macroeconometric models imply the problem of identifiability (Wójcik,

2014) of the studied structural parameters of the estimated model. The structural parameters of the examined multivariate model based on economic theory are subjectively fitted, so that if the examined econometric model lacks identifiability, its reduced form should be changed by adding or removing exogenous variables. The choice of selected regressors in the model is done by subjectively and arbitrarily selecting variables based on economic theory and estimating them by removing quasi-constant variables using the coefficient of variation or examining the correlation between the variables under study (dependent and independent) and multiple correlation. In Poland, an example of a hybrid multivariate model used by the National Bank of Poland to project inflation and output dynamics is the NECMOD model (Budnik et al., 2009), which takes into account, in accordance with classical theory, supply-side factors and the Keynesian implication in the form of fiscal stimulus. The above model, therefore, ranks between the mainly theoretical classical macroeconometric DSGE model and the vector-autoregression VAR model, which fully takes into account only empirical data. The exemplary multivariate NECMOD model ranks among the hybrid models, as shown in Figure 1.

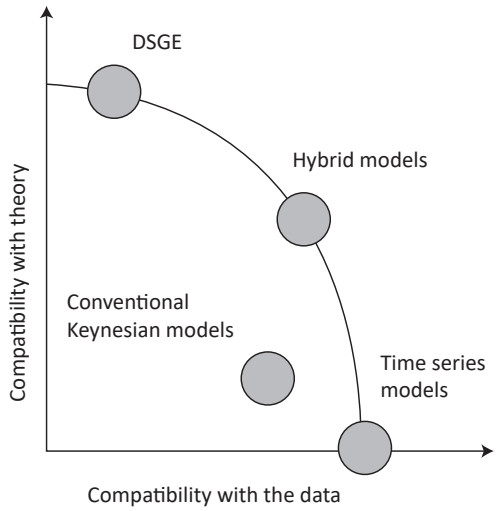

Figure 1. Typology of models used by analytical facilities of central banks

Source: own elaboration based on: Hara et al. (2009).

In the literature, the macroeconometric VAR model is a reliable (mainly by its consistency with empirical data) model for estimating Okun's Law as the relationship of output dynamics and the unemployment rate in the time series under

study, indicating the significance of the effect of lags on the variable under study. In addition, the model itself is also used especially for forecasting short-term economic activity, price dynamics (Robinson, 1998) or studying the impact of supply and demand shocks (Blanchard & Quah, 1988) on the above variables.

Representatives of the current of neoclassical synthesis use the concept of the phenomenon of hysteresis in the labour market as a sometimes exogenous cause of the occurrence of the production gap resulting from the rate of unemployable factors of production, as it results from a psychological factor in the form of disutility of labour. Hysteresis as a phenomenon in the deterministic view is the result of a traversal of a stationary state at a constant value of endogenous structural parameters, so that in the systems theory view such a traversal would arise from exogenous factors. In stochastic process modeling terms, such an impact is determined by the random component if the regressor is not a variable that reliably determines the strength of workers' bargaining over wages resulting from the marginal disutility of labour (Jamróz & Kilon, 2015). Thus, in economic theory, such an exogenous factor can be referred to as a random stray with drift. The issue of the influence of worker pressure in wage bargaining as an exogenous determinant of the hysteresis phenomenon is presented by Blanchard and Summers (1986) in their analysis of the causes of unemployment in the 1980s in Europe. However, not only is the above case a determinant of unemployment arising from events in previous periods, such also include the time interval in the acceleration mechanism (Chenery, 1952). Also in the formation of the unemployment rate, the phenomenon of hysteresis influences through the exogenous impact of fiscal policy determining the fluctuation of disposable income of unemployable individuals in social transfers, thus creating a structural unemployment rate and causing an increasing surplus of marginal disutility of labour between successive periods.

2. Research methods

To analyse the phenomenon of hysteresis in the labour market as an impact of the time series on the unemployment rate in the economy, the VAR vector-autoregression model extended by the synthesis of the classical trend model will be used to implement the optimally selected (based on the acquired estimates) trend model.

One of the classical methods of studying the effect of the studied dependent variable of the model on time as a predictor is models for the trend—trend as time series models. An important assumption of the model is that the time vari-

able does not act as an endogenous factor in economic terms, but as an external, exogenous factor influencing the studied dependent variable in econometric terms for the time series model. Thus, it represents a predictor that synthesises the influence of variables not included in the reduced form of the model. The first step in examining the impact of the trend is to "smooth" the time series by determining the trend function. Thus, the theoretical notation of the form of the time series model can be defined as (Gajda, 2001):

$$Y_t = f(t) + \varepsilon_t$$

where: Y_t is dependent variable of the model; $f(t)$ is trend function, ε_t is random component of the model.

In the following section, using Klein's method, a model estimate will be made for the trend function as a predictor; linear, quadratic, cubic and logarithmic, as shown in the Table 1. Then the most reliable model will be selected taking into account the absence of autocorrelation of the random component of the model, the randomness of the residuals, the highest fitting coefficient $R2$ and the statistical significance of the tested independent variables of the model falling within the confidence interval of 5%.

Table 1. The forms of trend models

Trend	Model form
Linear	$Y_t = \alpha_0 + \alpha_1 t + \varepsilon_t$
Square	$Y_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \varepsilon_t$
Cubic	$Y_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \varepsilon_t$
Logarithmic	$Y_t = \alpha_0 + \alpha_1 lnt + \varepsilon_t$

Source: own elaboration.

The final step in the analysis of the hysteresis phenomenon for the studied predicates is the estimation of the vector-autoregressive VAR model. The VAR model proposed by C. A. Sims has the form (Kilian, 2011):

$$X_t = \sum_{i=1}^{k} A_i X_{t-i} + \varepsilon_t$$
$$t = 1, 2, \ldots, n,$$

where: k is row of the VAR model; X_t is vector of observations of population values of n variables of the model; A_i is matrix of autoregressive operators of indi-

vidual processes, in which it is a priori assumed that there are no zero elements; ε_t is vector of the residual component, in which the given components are correlated with each other but there is no significant autocorrelation of the residuals.

The modified VAR model, which is an extension of the Sims model, takes into account deterministic trend and seasonality:

$$X_t = A_0 D_t + \sum_{i=1}^{k} A_i Z_{t-i} + \varepsilon_t$$

where: A_0 is matrix of deterministic trend values; D_t is vector of observations of deterministic trend values.

The construction of the vector-autoregression model is, compared to multivariate models, quite simple in its construction, which facilitates the estimation of the model and does not require the theory necessary in the selection of exogenous variables as structural parameters of the model. However, the estimation of the model itself does not lead to any particular conclusion if the study of the impact of the time series does not take into account a predetermined motive in the form of a hypothesis underlying, for example, a macroeconomic rule or mechanism (such as unemployment hysteresis). In addition, in order to correctly estimate the model for the variable under study with a specified distribution of lags, it is necessary to verify the model:

- stationarity of the studied variables,
- optimal selection of the lag order of the model under study,
- the study of autocorrelation of the random component.

According to the included assumptions towards model verification, the stationarity of the model's residuals should first be examined using the Dickey-Fuller (ADF) test. The stationarity of the model requires that probability distributions with successive periods jointly and conditionally show no change with shifts, with weak stationarity of the time series being sufficient for the reliability of VAR model verification. Then, in order to avoid the undesirable phenomenon of autocorrelation, it is necessary to estimate the correlogram of structural parameters using the PACF partial autocorrelation test and the Ljung-Box test, which, together with the Akaike AIC, Schwarz BIC and Hannan-Quinn HQC information criterion tests, will allow to select the optimal lag distribution of the variables under study for the vector-autoregression model. After the estimation of the vector-autoregression model, the forecast will be estimated by using dynamic prediction, which will determine the point forecast with *ex ante* error and interval forecast.

The statistical data of the examined structural parameters of the estimated models were expressed as percentage change indexes. In addition, the estimation performed adopted a subjective confidence interval of $\alpha = 0.05$.

3. Results

The estimation of the trend model using Klein's method for the predictor under study showed an implication to the established assumptions. In the case of testing the randomness of the sample elements, the significance of the series test, where the *p*-value was 0.17, showed that the sample elements are random, so the established assumption of the randomness of the model residuals was met. The problem for the estimation of the trend model was the presence of significant autocorrelation of the model's 1st order residuals, so that in the time series studied, the variables showed autocorrelation of the residuals for the 1st order lag of the predictor. The best fit of the variables to the model showed the trend model for the quadratic trend, so that despite the presence of significant autocorrelation of the 1st degree residuals, the predictors of the time series model for the quadratic trend will be used. For the cubic trend model, the variable "cb_time" (cubic trend) showed a lack of statistical significance for the subjectively determined confidence interval. The estimation of the time series model for the trend for all forms of the model except the cubic trend showed significant dependence of the unemployment rate as a regressor of the model on the trend, as shown by the results in Table 2.

Table 2. Estimation of trend models; linear, quadratic, cubic and logarithmic for unemployment rate regressor

Series test result ≈ 0,17	**Model form**			
Dependent variable: UnemploymentRate	$Y_t = \alpha_0 + \alpha_1 t + \varepsilon_t$	$Y_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \varepsilon_t$	$Y_t = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \varepsilon_t$	$Y_t = \alpha_0 + \alpha_1 \ln t + \varepsilon_t$
Adjusted coefficient of determination R^2	72.88%	95.16%	95%	89.73%
p-value for α_0	≈0	≈0	≈0	≈0
p-value for α_1	≈0	≈0	≈0	≈0
p-value for α_2	–	≈0	0.039	–
p-value for α_3	–	–	0.65	–
Significance of Durbin Watson test statistic	≈0	≈0	≈0	≈0
The value of the Durbin Watson test statistic	0.22	1.07	1.06	0.47
Occurrence of significant autocorrelation of first-degree residuals	yes	yes	yes	yes

Source: calculations made with the Gretl statistical program using the Stat.gov.pl database (2022).

The next stage in the estimation of the time series model is the econometric forecast for the next two periods, taking into account the point and interval forecasts. The model used, in which the estimation was carried out using the classical method of least squares, takes the form of a quadratic trend, in view of which it is a forecast of the static type (Davidson & MacKinnon, 2004; Kufel, 2007). The extinct forecast for the predicate using the Gretl statistical program for the time series under study proved to be partially accurate. With ex-post errors taken into account, the point forecast estimates proved to be inaccurate for the periods: Q3 2015, Q1 2016, Q1 2017, Q3 2019, Q4 2020, Q1 2021 and Q4 2021. More relevant to the study of unemployment rate prediction, however, is the range forecast, as shown in Figure 2. Suggesting the acquired data of Statistics Poland on the registered unemployment rate, the estimation of the interval forecast of the quadratic trend proved accurate for all observations.

The first step in meeting the assumptions necessary for reliable estimation of the vector-autoregression VAR model is the optimal selection of the lag distribution

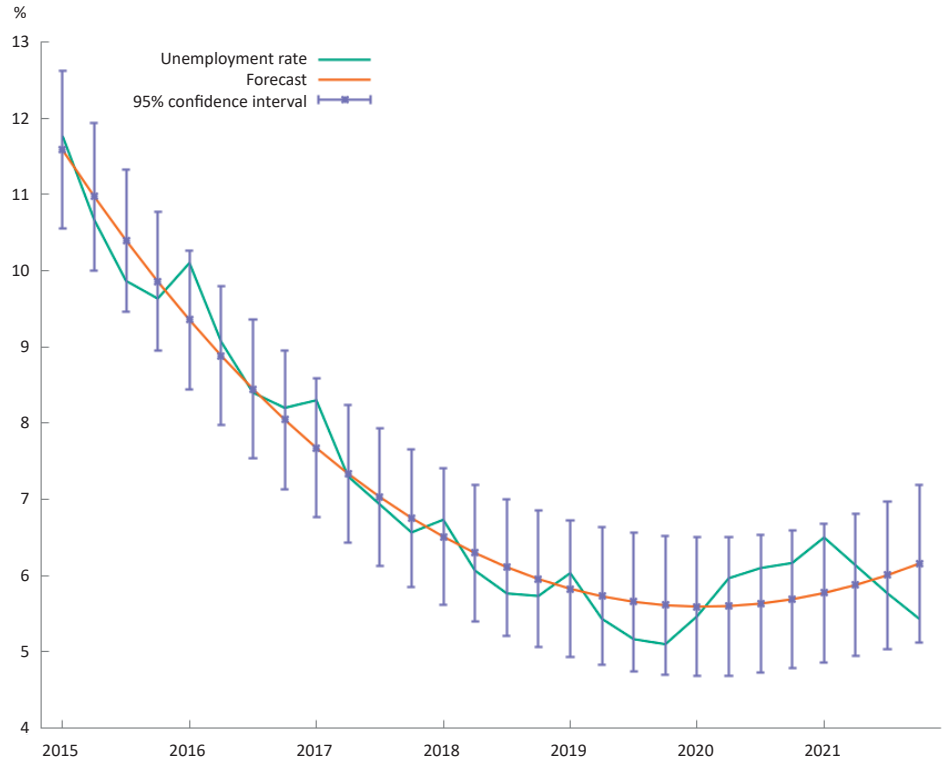

Figure 2. Graphical visualisation of the forecast of the quadratic trend model

Source: chart generated with the Gretl statistical program using the Stat.gov.pl database (2022).

of the structural parameters under study by estimating the Akaike AIC, Schwarz BIC and Hannan-Quinn HQC information criterion. In addition, to reliably verify the optimal selection of the lag distribution of the estimated VAR model, the reliability quotient LR will be considered (Hatemi-J & Hacker, 2009).

All the estimated information criteria in Table 3 indicate the selection of an order of delay equal to 3 as the smallest value of the information criterion. In addition, the LR reliability quotient for the delay order indicated as optimal by the criteria positively verifies the selection.

Table 3. Information criteria; AIC, BIC, HQC and LR reliability quotient test for constructed VAR model

Lag	loglik	*p*(LR)	AIC	BIC	HQC
1	–8.08626		1.340522	1.733207	1.444701
2	–3.63622	0.00285	1.053019	1.494789	1.17022
3	8.7446	0.00000	0.104617*	0.595473*	0.234841*

Note: * indicates the lowest value of the information criterion index.

Source: calculations made with the Gretl statistical program using the Stat.gov.pl database (2022).

For the ADF test, the variable of first differences in the unemployment rate will be used.

Conducting the ADF test showed that for a model without free expression, the null hypothesis should be rejected in favour of the alternative hypothesis, since the significance of the test conducted showed the lack of integration of the first degree, and therefore the stationarity of the time series in the model under study. According to the results of the test in Table 4, the first difference model of the variables should be used for the estimation of the VAR model.

Next, for the production dynamics variable, the ADF-GLS test was carried out, taking into account the significance of the lag from the indicated order of the modified AIC criterion and the Perron-Qu method (Perron & Qu, 2007), which showed

Table 4. Testing the stationarity of the random component of the model for the value of the variable and first differences

ADF test without free expression for first differences „UnemploymentRate"	
ADF test estimate	*p*-value
–4.015	≈ 0
ADF-GLS test without free expression for the variable "GDPgrowth"	
ADF-GLS test estimate	*p*-value
–2.168	0.03

Source: calculations made with the Gretl statistical program using the Stat.gov.pl database (2022).

statistical significance (*p*-value ≈ 0.03) for the values of the variables. According to the above study, the values of the production dynamics variable will be used to estimate the vector autoregression model and verify the model's assumptions.

The final step in the verification of variables as predictors of the dependent variable of the unemployment rate is the estimation of the correlogram of structural parameters using the PACF partial autocorrelation test and the Ljung-Box test, which will also allow to select the optimal lag distribution of the studied variables for the vector-autoregression model. Both the created variable for the first differences of observations of the unemployment rate showing stationarity of the time series and the production dynamics variable are not statistically significant for the third observation of the lag distribution for the PACF autocorrelation tests conducted, as shown in Table 5. For the Ljung-Box autocorrelation test, only the variable of the first increments of the unemployment rate did not show statistical significance.

Table 5. Test of autocorrelation with the PACF partial autocorrelation test and Ljung-Box for first differences in unemployment rate observations

	Delay	PACF autocorrelation test	Ljung-Box autocorrelation test	*p*-value
UnemploymentRate variable for first differences	1	0.1634	0.8039	0.37
	2	–0.1189	1.0523	0.591
	3	0.0126	1.0705	0.784
GDPgrowth	1	0.4367	5.9318	0.015
	2	0.1152	8.5365	0.014
	3	–0.2186	8.5436	0.036

Source: calculations made with the Gretl statistical program using the Stat.gov.pl database (2022).

The estimated vector-autoregression model, after taking into account the theoretical assumptions and the implications of the the cubic trend, which showed a very good fit of the variables to the unemployment rate regressor model estimate of the coefficient of determination *R*2 (95%), in the conducted study takes a reduced form:

$$dU_t = \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \beta_1 dU_{t-1} + \beta_2 dU_{t-2} + \beta_3 dU_{t-3} + \\ + \gamma_1 Y_{t-1} + \gamma_2 Y_{t-2} + \gamma_3 Y_{t-3} + \varepsilon_t$$

where: dU is vector of observations of the variable „UnemploymentRate" for the first differences in the model; t, t^2, t^3 is vector of trend (linear, quadratic and cubic) of the model; Y is vector of the "GDPgrowth" predictor; α, β, γ is matrices of values of predictors of the model; ε_t is random component of the model.

The estimation of the model using Klein's method (Hall et al., 2014) showed that, with the confidence interval established, the distribution of third-degree lags was statistically significant for the "GDPgrowth" predictor for period $t-1$, the cubic trend, and all tested lags for the first differences of "UnemploymentRate", as shown in Table 6. Accordingly, the model positively verified the hypothesis of the existence of unemployment hysteresis in the Polish economy and, in accordance with the mechanism of the acceleration principle of the acceleration mechanism, the significance of production dynamics in previous periods. In addition, in the examined time series, the trend for the model showed high statistical significance, so that the phenomenon of hysteresis in the labour market in Poland defines random erring with drift determined by a deterministic trend. The coefficient of determination *R*2 for the model showed a satisfactory fit: 76.64% ∈ [60%;80%].

Table 6. Vector-autoregressive model estimation for selected predictors

Explained variable: dU_t	Coefficient	*p*-value
t	–0.328	≈0
t^2	0.03	≈0
t^3	–0.001	≈0
Y_{t-1}	–0.064	0.002
Y_{t-2}	–0.034	0.064
Y_{t-3}	–0.018	0.4692
dU_{t-1}	–0.865	≈0
dU_{t-2}	–0.8	≈0
dU_{t-3}	–0.778	≈0

Source: calculations made with the Gretl statistical program using the Stat.gov.pl database (2022).

The results shown in Table 7, show that the estimated point dynamic forecast for the estimated vector-autoregression model of the unemployment rate showed the model's lack of relevance to the actual unemployment rate during the period under study. The value achieved by the estimation was about 5.26% for Q1 2022 with an *ex ante* error of about 0.1788%, where the actual value of the unemployment rate in the quarter under study was 5.467%. However, the estimated dynam-

Table 7. Dynamic prediction for the predicate of the variable of first differences "UnemploymentRate"

Period	Point forecast	*Ex ante* error	Interval forecast	Actual value
1Q 2022	–0.173081	0.1788	[–0.554184;0.208022]	0.037

Source: calculations made with the Gretl statistical program using the Stat.gov.pl database (2022).

Figure 3. Graphical visualisation of the VAR model prediction for the dynamic forecast for the next period

Source: chart generated with Gretl statistical program using Stat.gov.pl database (2022).

ic forecast interval proved to be accurate, as the range of the estimated forecast value was ϵ [4.879146;5.641352], as visualized by the attached Figure 3.

4. Summary of the empirical research

After making the necessary assumptions to verify the reliability of the estimated time series models, which were then estimated, it may be concluded that the results produced using statistical inference met the analysis objective of the article. Both the model of the quadratic trend of the interval forecast and the vector-autoregression model using dynamic prediction method showed an accurate interval forecast in accordance with the actual data produced by Statistics Poland. In

addition, the estimation of the quadratic trend model showed the statistical significance of the time variables in the estimated model for the unemployment rate in the studied time series, so that the fluctuations in the state of employment are significantly determined by the trend in the studied time series. The estimation of the vector-autoregression model, the subject of which was the hysteresis in the labour market and the macroeconomic Okun's Law, showed that, except for the structural parameters for the third and second lags of the production dynamics, the examined structural parameters positively verified the phenomenon for the subjectively determined confidence interval.

Conclusions

The purpose of the study discussed here was to empirically verify the occurring phenomenon of hysteresis in the labour market and the relationship resulting from the macroeconomic Okun's Law. In order to carry out a reliable analysis, it was necessary to estimate structural parameters through statistical inference and use a macroeconometric time series model of vector-autoregression VAR synthesising the model with the trend of the unemployment rate. The study on the available statistical database for the period 2015–2021 in the quarterly sequence showed that the state of employment in Poland determines the time series, which then verifies the hypothesis of the occurrence of hysteresis in the labour market. In addition, the unemployment rate in Poland shows a significant dependence on the dynamics of production, so the study empirically verified Okun's Law positively.

The results obtained in the study after a reliable estimation of the vector-autoregression model and the included assumptions on the selection of the lag distribution and the stationarity of the time series showed that the dynamic forecast of the estimated model determined a posteriori accurate interval prediction comparing with the available data on the unemployment rate in Poland. Accordingly, the conducted study suggests the usefulness of the VAR model with consideration of the trend in forecasting the unemployment rate for the Polish economy. The application of the vector autoregression model also among other researchers on the example of the economy in the Philippines has proven to be a good model to study the hysteresis phenomenon when taking into account the impact of production dynamics (Valera & Dean, 2021).

The conducted analysis also provides a useful suggestion for analysts conducting research on economic fluctuations and policy mix practitioners to use time series models based to the greatest extent from the methodology of the field of positive economics characteristic of empiricism and economic operationism in place

of long-run macroeconometric models based on estimation under the assumption of stationary state of Walrasian equilibrium. Similar conclusions have also been reached by other econometricians, who have demonstrated the high utility and forecasting accuracy of the VAR model for the study of macroeconomic variables in Poland with the assumptions necessary for reliable model verification included in the following paper (Warzecha & Wójcik, 2014; Wójcik, 2014).

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Third time lucky: An analysis of Paris' bids for the Olympic Games in 2008, 2012 and 2024

Julia Jastrząbek[1]

Abstract

The Olympic Games have become a unique occasion to implement several projects to upgrade public infrastructure and improving the economic performance of the host city. Thus, some cities are so determined to host the event that they decide to bid multiple times. One of the examples of such a city is Paris, which since the 2000s has submitted its bids three times, for 2008, 2012 and 2024, of which the last attempt turned out to be successful. Based on the above, the main aim of this article is to present the trajectory of changes and developments made by the three successive bid campaigns, with an emphasis on the latest successful one for the 2024. This study demonstrates that there are some recurrent ideas, projects and plans shared by each bid with some modifications to emphasise their uniqueness, novelty and up-to-date approach. In some aspects, the Paris 2024 bid builds on its previous candidature from 2012 in the field of long-term legacy effects and sustainability. Therefore, the bid managers and the city authorities take a consistent action in terms of using the Olympic Games as a tool for urban regeneration and sports development.

Keywords

- Olympic Games
- Paris
- urban development
- strategy

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[1] Poznań University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland, julia.jastrzabek@ue.poznan.pl

Introduction

The modern Olympic Games are an extremely complex project. Apart from its sport dimension, historically rooted in ancient times and celebrated through sport competition of the greatest athletes, this event represents several important non-sports features today. Although the Olympics are a relatively short-term spectacle, they are preceded by years of preparations, including various infrastructure projects such as the construction of sports venues, transportation improvements, the tourist base, the revitalisation of urban facilities and the development of public spaces.

Usually, cities of strategic importance to the regional and national economy implement urban development policies, which embrace the social, economic or infrastructural sectors. This is especially important when city authorities use several instruments to tackle the objectives of urban policy and identify the most crucial issues to resolve. The Olympic Games promise to represent a 'fast track' urban regeneration, a stimulus for economic growth, significant improvements in the transport system, as well as intangible effects such as improved global recognition and prestige (Chalkley & Essex, 1999, p. 369) or influence the subjective well-being of the residents of the host city during the event (Dolan et al., 2019). Bidding cities embodied by public authorities and private sector representatives try to maximise the potential from hosting the Olympic event to conduct a multidimensional urban and socioeconomic transformation.

Over the last decades, the literature on the various impacts and legacies of the Olympic Games has expanded significantly, but the research outcomes are rather ambiguous and depend on the applied research perspective. Economic studies are mainly dedicated either to analyse the cost and benefits of the Olympic Games in the context of economic viability of staging the Games (Baade & Matheson, 2016) or to estimate the impact of the event on basic macroeconomic variables in the cause-and-effect analysis. For example, Rose and Spiegel (2011) find out that the Olympic host countries experience significant positive, lasting effects on exports and that similar effect applies to bid countries. But Maennig and Richter (2012) challenge the empirical findings of this study, because they may suffer from selection bias and, with an appropriate matching and treatment methodology, lasting positive effects on export diminish. In the similar fashion of countering research results are the studies on the 'news shock effect' hypothesis due to the Olympic bid, where Brückner and Pappa (2015) confirm this positive effect, while Langer et al. (2018) challenge these findings because they may suffer from selection bias and, by redesigning the econometric model, the authors do not find a significant economic effect. The recent study by Firgo (2021) proves that the Summer Olympics show positive effects on regional GDP per capita for the year of the event and the year before, but the results on positive longer-term effects are less robust; a differ-

ent situation exists with the Winter Olympic Games where no positive effects are observed. Most of the studies from the management field focus on the aspect of Olympic governance and stakeholders through analysing the links, networks and decision making in the processes related to the Olympic Games (Chappelet, 2016, 2021; Parent, 2013). The social research perspective investigates the influence of the Olympic Games on the society's emotional and practical approach to sport, i.e. the way it may boost national pride, community spirit, festive atmosphere and the feel-good factor (Kavetsos & Szymanski, 2010). However, a history of previous Olympic editions shows several examples of negative or adverse legacies in the urban and socioeconomic sphere, where promises included in the bid books did not meet the post-Games reality (see e.g. Müller, 2015). The ambiguity of quantitative empirical findings, also due to selection bias of the research sample, lead us to the fair conclusion that candidate and host cities are very heterogeneous, which underscores the need for complementary case studies.

Considering the issues listed above, some cities are so persevering to host the Olympics that they decide to bid for the event multiple times. Such cities perceive the Olympic Games as a driving force to carry out urban and socioeconomic projects that would be conducive to the city development. One of the examples of such a city is Paris, which in the 21st century submitted bids three times—for the Olympics in 2008, 2012 and 2024, of which the last attempt turned out successful[2]. Therefore, the main objective of this article is to present the trajectory of changes and developments made for the three successive bidding procedures, with an emphasis on budget, key legacy goals, long-term urban development strategies and sustainability issues.

1. Legacy planning and socioeconomic impacts of the Olympic Games: a literature review

The Olympic-driven urban and socioeconomic development has an evolutionary character (Chalkley & Essex, 1999; Essex & Chalkley, 1998; Gold & Gold, 2017). The very first modern Olympic Games were rather a modest occasion, held with international exhibitions such as the World's Fair. Despite the rather secondary character of this event at the beginning of the twentieth century in terms of its contribution to urban development, the first modern Olympics in 1896 left Athens with some improvements in the urban landscape. The Panathenaic Stadium was

[2] In the past, Paris was a host city in 1900 and 1924 and unsuccessfully bid for the 1992 Olympic Games.

built on the site of the ancient one, becoming a landmark and tourist attraction of the capital. Basically, until the 1960s, both the Summer and Winter Games were organised on a relatively small scale, with a very modest contribution to the urban infrastructure and local economy. Since the 1960s, a growing demand for non-sport urban infrastructure has been observed, and the Games have started to involve large-scale urban transformations, which have performed as tools of municipal and regional development (Essex & Chalkley, 2003, p. 7). As a consequence, the Olympic Games have become a catalyst of urban change (Chalkley & Essex, 1999; Essex & Chalkley, 1998), and an important force for global urban development (Müller & Gaffney, 2018, p. 1). Gold and Gold (2017) provide a comprehensive review of city agendas, planning and portraits of host cities in the period between 1896 and 2020 with an extended analysis of urban and socioeconomic impacts and legacy. The authors also present a four-stage trajectory of urban regeneration and renewal throughout the modern era of the Olympic Games, particularly summer editions—from the regenerative impact on host cities between 1896 and 1980; then a more economically rational and private sector-led model of Olympic regeneration management; next by going through the development as a more holistic and city-wide models of regeneration, firstly adopted in Barcelona 1992; and finally by discussing attempts made since 1992 to implement the Barcelona model for Olympic host city regeneration, taking into consideration a growing importance of environmental impacts of holding the Games.

The emergence of the Olympic Games as a tool for urban regeneration has increased significantly due to several factors. Each subsequent edition of the Games has seen a growing number of sports and athletes, media expansion and an increasing role of commercial sponsorship and marketing (IOC, 2020). Therefore, the character of this event has significantly changed as host cities have commenced to use the Olympics as a stimulus for much wider urban development (Essex & Chalkley, 2003, p. 7). This enhances the promotion activities of the 'placemaking' of the host city in the context of Olympic cycle: from bidding, planning, preparing the event, to hosting the Games, and finally developing and maintaining a variety of legacies. Cities strive for capital and labour inflow, as well as a tourism industry boost, to improve their position on a global economic stage in a highly competitive environment. This kind of action can cause a signalling effect to a global audience that the city is under a transition process, opened up to new businesses, events and changes in the urban lifestyle (MacRury, 2009, p. 59). This trend is in line with David Harvey's (1989) concept of a shift from managerialism to entrepreneurialism in urban governance that has been preoccupied with seeking new ways and possibilities to improve urban and socioeconomic development. Moreover, the evolutionary and complex character of the Olympic Games is driven by neoliberal doctrine in making local development policies (Burbank et al., 2002). The Olympic event not only initiates the construction of new sports venues and transport sys-

tems, but also shapes or reconfigures urban governance arrangements and strategic development plans, affecting cities and residents (Müller & Gaffney, 2018, p. 2). Every city has its own characteristics; thus, mega-event strategies on urban development should be tailored to respond effectively to its problems and challenges.

Impact and legacy are key terms for understanding the rationale and motivation of cities behind the decision to bid for the Olympics. The term impact refers to short-term effects derived from the organisation of the Olympic Games. In most cases, the impact studies take the form of *ex ante* or *ex post* quantitative analyses related to economics (Gratton & Preuss, 2008, p. 1925). However, having recognised the growing number of operations and actions related to the event, along with raising questions about the costs and benefits of the organisation, the concept of legacy has been developed to embrace the long-term character of several impacts driven by the organisation of the Olympic Games. Apart from quantitative effects, the term legacy includes qualitative aspects and provides a holistic framework for event assessment. The Olympic legacy "encompasses all the tangible and intangible long-term benefits initiated or accelerated by the hosting of the Olympic Games/sport events for people, cities/territories and the Olympic Movement" (IOC, 2017, p. 13). With the growing importance of sustainability issues in the Olympic Games, the term legacy (defined as physical, economic, environmental, social, cultural, psychological, political or even ideological impacts) can be combined with the concept of sustainable development, indicating how the Olympic event can contribute to sustainability in urban milieu (Furrer, 2002, pp. 2–3). In turn, Preuss (2007) defines legacy as "all planned and unplanned, positive and negative, tangible and intangible structures created for and by a sport event that remain longer than the event itself, irrespective of the time of production and space" (p. 211).

Since the last few years, the notions of legacy and sustainability have both been substantially developed, and simultaneously, become one of the most researched subjects in the field of the Olympic Games (Agha et al., 2012; Boykoff, 2017; Chen, 2015; Gaffney, 2013; Gold & Gold, 2013; Müller et al., 2021; VanWynsberghe et al., 2021). Furthermore, the Olympic Games planning process required a better alignment with long-term urban development plans. These aspects were undoubtedly induced by increased public awareness about the adverse impacts caused by the Games, together with concerns about their cost and complexity. As a response to these issues and to make the event more attractive to cities, in December 2014, the IOC unanimously agreed on the Olympic Agenda 2020: "a new strategic roadmap for the future of the Olympic Movement" (IOC, 2014). The final document in the form of 40 recommendations was preceded by months of consultations, enriched by ideas and contributions submitted by various stakeholders within the Olympic Movement as well as external organisations and individuals. The next milestone in reforming the Olympic Games lifecycle (Candidature, Delivery, Legacy) was the

release of 'the New Norm' in February 2018. This document contains more than 100 measures that apply to six recommendations (1–4; 12–13) related to the organisation of Olympic Games (IOC, 2018). Most importantly, they put an emphasis on more cost-effective and reformed bidding process, sustainability, well-suited legacy for the host city and maximum use of existing or temporary facilities to reduce costs. The 2024 candidature process was the first conducted according to the new procedure implemented with the Olympic Agenda 2020 and New Norm documents. Five cities (Budapest, Hamburg, Los Angeles, Paris, Rome) entered the non-committal Invitation Phase, but only two cities—Paris and Los Angeles—sustained interest in staging the Olympic Games until the end of the bidding procedure. The other three cities withdrew during the Candidate City phase. Paris and Los Angeles presented very strong proposals that reflected the recommendations of the Olympic Agenda 2020. Therefore, in July 2017 after a Tripartite Agreement between the IOC and both cities, Los Angeles changed its candidature from 2024 to 2028. It paved the way for an unprecedented decision to simultaneously award the 2024 Olympic Games to Paris and the 2028 to Los Angeles.

2. Materials & methods

The three Paris bids for the Olympic Games in 2008, 2012 and 2024 were selected to investigate their main aspects in terms of urban and socioeconomic development and sustainability issues. Of these three bids the 2024 bid turned out to be successful. The author focuses on the anticipated plans, a trajectory of urban and socioeconomic changes, together with their alignment with long-term city development strategies. The analysis is based on official bid documents, the Organising Committee publications, IOC reports and evaluations. Therefore, it may not include potential changes that appeared over time, since Paris was elected as a host[3]; however, several updates on the Games preparations for 2024 are present. To provide a more holistic view, an urban and socioeconomic diagnosis of the French capital is drawn to identify its major problems and challenges, and in what way the Olympic project responds to them. This study applies comparative and descriptive methods based on analysis of bid books, articles, reports, press releases, official web sources and other available sources to present urban and socioeconomic interventions and the legacy planned throughout all three Paris bids.

[3] From host city election, some changes and modifications in planning and delivery may appear in comparison to the original project presented in bid book.

3. Results

The results of this study are comprehensively presented in Table 1. All three bids were analysed according to various selected criteria, such as the financial aspects, key legacy goals, alignment with long-term urban planning strategies, sustainability issues, types of sports venues, Olympic Village and its post-Olympic use, transport improvements, as well as public support, which is a very important factor in tracing people's support throughout every subsequent bid.

As the time span of all Candidatures spreads between 2000 (candidature process for the 2008 Olympic Games) and 2017 (host city election for 2024), the financial data include the budget values in current (at the time of bid creation, approx. 8 years before the event) and constant prices expressed in USD_{2016} (see Table 1)[4]. The latter expression aims to control the effect of inflation. There is also an issue of the types of budget. Usually, we distinguish between three types of budgets: Organizing Committee for the Olympic Games (hereafter: OCOG), non-OCOG (direct) and non-OCOG (indirect). The OCOG budget is mainly privately financed with a large IOC contribution that comes from different revenue sources, mostly sponsorship programmes and the sale of broadcasting rights. In turn, the non-OCOG (direct) budget is provided and controlled by the local authorities and divides generally into two elements: the capital investment budget that is directly related to the construction of competition and non-competition venues, and the operations budget comprising the operational services of public authorities such as security, transport, medical services, etc.). The third type is the so-called non-OCOG (indirect) budget and is related to a long-term investment plan for general infrastructure which is independent of the Games, such as improvements to public transport (roads, airports and railways) or other projects. This budget is usually funded by the public authorities at different levels (city/region/country) (IOC, n.d.). The latest Parisian bid stands out from the others with a very high financial participation from the private sector, thus mitigating the pressure on financing the Games from the public purse, which is always a highly debated issue on the Games' inflated budgets rather than fulfilling urgent needs in the areas of public policy. The organisers claimed that the Paris 2024 OCOG budget will be 97% funded by the private sector, with only 3% funded by the public sector (for the Paralympic Games), while the budget for delivering the Olympic and Paralympic venues will be mostly funded from public financial resources (SOLIDEO, n.d.). In

[4] Candidature Files include the Olympic budgets calculated in USD (and usually in national currency), and that is why the author decided to implement this currency rather than EUR, and also because the US dollar is the global currency and allow us to make international comparisons. The figures are inflation adjusted to the year 2016 by using the US GDP deflator for the years 2000, 2004 and 2016 (World Bank, 2022).

Table 1. Paris bids for the 2008, 2012 and 2024 Olympic Games: a comparative analysis

Subject	Paris 2008	Paris 2012	Paris 2024 (Phase 1–3)
Competition (Candidature Phase)	**Beijing–Host City**, Istanbul, Osaka, Toronto	**London–Host City**, Madrid, Moscow, New York City	Los Angeles–Host City 2028
Budget (Total expenditure, in billion USD)	– 3,915 (USD_{2000}) – 5,306 (USD_{2016})	– 8,863 (USD_{2004}) – 11,046 (USD_{2016})	– 7,269 (USD_{2016})
OCOG budget	– 1,877 (USD_{2000}) – 2,544 (USD_{2016})	– 2,658 (USD_{2004}) – 3,313 (USD_{2016})	– 4,083 (USD_{2016}), Phase 3 of the Candidature Process
Non-OCOG budget (direct or/and indirect expenditures)	– 2,038 (USD_{2000}) – 2,762 (USD_{2016})	– 6,205 (USD_{2004}) – 7,733 (USD_{2016}) – Non-OCOG capital investments budget, which includes direct and indirect expenditures.	– 1,049 (public financing) (USD_{2016}), Phase 2 – 2,137 (private financing) (USD_{2016}), Phase 2
Key legacy goals	– The rejuvenation of a sector of the city in the Saint-Denis area close to the Stade the France—the Olympic Village – Major transport improvements	– The Olympic Games as a tool for the urban development and regeneration of Saint-Denis—one of the poorest areas in France and a former industrial site. The Olympic Village as a significant housing opportunity and a benchmark for sustainable development and environmental innovation in this area – Upgrading and expansion of the transport infrastructure – Legacy through the building of new sports venues to increase the regular participation of youth in sport	– Games-related investments in Saint-Denis are aimed at contributing to the socioeconomic development of one of the most diverse and poorest areas in the region. The Olympic Village in the Grand Paris Zone to be converted into much-needed housing after the Games – Upgrading and expansion of the transport infrastructure; transport connections between Saint-Denis, the city centre and airports – Significant improvements in sustainable development and the environment (a goal of becoming Europe's first sustainable ecoregion) – Important social legacy through various initiatives based on the principles of inclusion, civic responsibility and engagement

Subject	Paris 2008	Paris 2012	Paris 2024 (Phase 1–3)
Alignment with long-term planning strategies (urban and transport)	– Venues and investments are an integral part of the region's urban planning programme	– The Strategic Action Plan of the French Government and the Île-de-France Region – The Local Urban Plan (PLU) and the Urban Transport Plan (PDU) of Paris – The Development Scheme of the Île-de-France Region (SDRIF) – The Paris 2012 Strategic Transport Plan (STP)	Full integration with long-term development strategy: – The Paris Region masterplan for 2030 (adopted in 2013) – Long-term urban planning schemes in three territories mainly impacted by the Olympic Games (Plaine Commune, Le Bourget and the City of Paris) – Grand Paris development strategies – The State-Region Planning Contract (fully aligned with the Games concept; a major enabler in implementing the Paris Region's development strategy for 2015-2020) – New Grand Paris Transport Plan
Selected sustainability and environmental issues	– Importance of sustainability and environment protection – Environmental Action Plan – Commitment to sustainable development (controlling direct and indirect effects, controlling the impact of transport on the environment, the economic use of natural resources; protecting, managing and restoring biodiversity, natural landscapes and cultural heritage; involving various sectors of the population	– Sustainable development and 'environmental excellence' as key themes – Core commitment to ensure that the Games generate zero net greenhouse gas emissions and have a sustainable legacy – Olympic Village as a symbol of 'environmental responsibility' – Reduce noise and air pollution	– Sustainability as a core theme of Paris 2024 – Paris 2024 as a benchmark for future international sports events and the sport movement – Sustainability embedded in Games governance and delivery throughout the whole Games cycle – Paris 2024 Environmental Excellence Strategy – Adoption of ISO 20121 for the management of sustainable events (certification earned in March 2017, first time at the bidding stage)

Venues (total)	– 39	– 32	– 38 (Phase 3)
% of existing venues	– 56,4% (22)	– 37,5% (12)	– 72,2% (28)
% of newly built	– 23,1% (9)	– 21,9% (7)	– 5,6% (2)
% of temporary	– 20,5% (8)	– 40,6% (13)	– 22,2% (8)
Zones/Clusters	– Four zones (north-eastern: most events; the Olympic Village and the Olympic stadium, centre, south-western, southern); compact Games with short distances between venues	– Two major clusters: Northern—Plaine Saint-Denis and Western—Porte d'Auteuil, Bois de Boulogne); compact Games with short distances between venues	– Two main zones: The Paris Zone (in the city centre) and The Grand Paris Zone (in Saint-Denis); compact Games with short distances between venues
Olympic Village	– Newly built as part of the urban development project for Saint-Denis Plain	– 'One village, two clusters' – Newly built as an urban redevelopment project in the Batignolles district – As a legacy of the bid, new 3,500 housing units were built in Paris-Batignolles through public and private funding	– Newly built on the boundaries of Saint-Denis, one of the poorest and underdeveloped areas in France, Île-Saint-Denis and Saint-Ouen
Post-Olympic Use of the Olympic (Athletes') Village	– Olympic Village: conversion to family housing	– Olympic Village: A new quarter of the French capital—the "Olympic Quarter". A significant new residential district, offices, leisure, commercial, retail, community, educational facilities	– Olympic Village: a new residential district with extensive leisure, commercial, community, educational facilities. Located close to a new metro station and other transport links
Media Village	– Media Village: "Cité Universitaire" Media Village (6,500 people), new accommodation (3,000 rooms) and additional 7,500 rooms in hotels	– Media Village: accommodation based on existing hotel rooms and newly built hotels up to 2012 to provide additional capacity	– Newly built Media Village on a site adjacent to Paris Le Bourget, host of the MPC and existing accommodation capacity

Subject	Paris 2008	Paris 2012	Paris 2024 (Phase 1–3)
Transport improvements	– Suburban express lines (RER) and improvements to tramway lines, roads and railways	– Several transport investments, mainly in rail public transport – All Olympic and Paralympic venues would be served by existing public transport facilities—bus, metro, tram, RER and trains	– 100% spectator travel by public transport – Transport links between the Seine-Saint-Denis and the city centre, for example, the Grand Paris Express project
Public support	– October 2000 (bid book): – France: 86% (against 10%) – Île-de-France Region: 88% (against 9%) – Paris: 79%	– October 2004 (bid book): – Paris: 77% – Île-de-France Region: 77% – France: 79%	– January 2016 (bid book): – Paris: 74% – Paris Region: 77% – France: 80%

Source: own work based on: Paris 2008 Candidate City (2000); Paris 2012 Candidate City (2004); Paris 2024 Candidate City (2016, 2017).

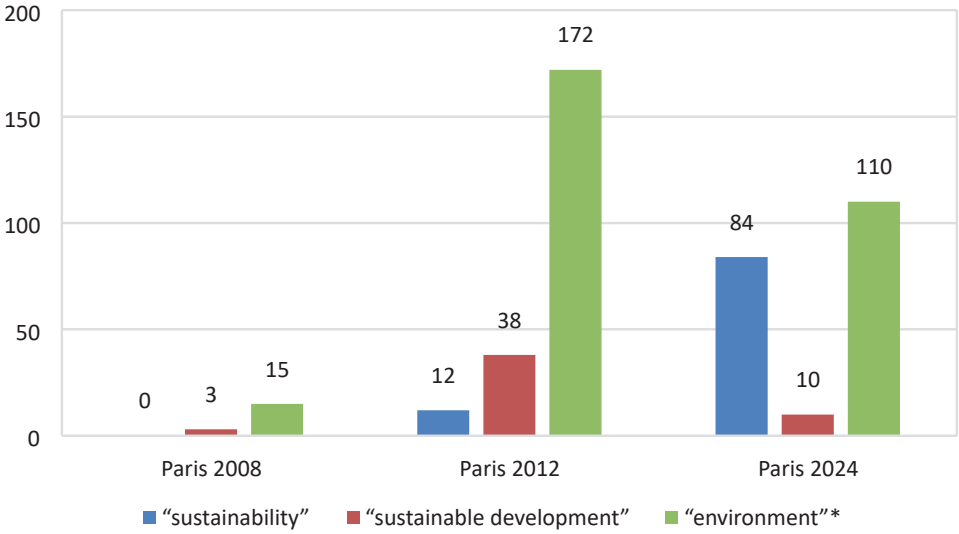
terms of budgetary issues, it is important to clearly divide public and private financial responsibilities. Therefore, there is a crucial role of close cooperation between all stakeholders representing the public sector, private sector and civil (non-commercial) sector (NGOs, local communities, social organisations, etc.) to ensure a socially just legacy agenda.

The analysis shows that the 2012 and 2024 bids have several common points in terms of strategic aspects such as legacy goals, post-Olympic use of the Olympic Village or sustainability issues. The Paris 2024 bid was to some extent inspired by its previous candidature from 2012, where great emphasis was placed on long-term legacy effects, particularly in urban space and the most disadvantaged departments in France, among them Saint-Denis. This area was also a subject of regeneration agenda in the bid for the 2008 Olympic Games, especially in terms of the location for new venues. In the Paris 2012 bid, the Olympic Village was planned to be built in the Batignolles district, and despite the fact that this bid was not elected, the urban project of this area was a bid legacy successfully realised by providing 3,500 new housing units and a large parkland (Paris 2024 Candidate City, 2016, p. 25). However, we can observe a consistency in treating the Saint-Denis area as a priority for urban change and development in the three bids. The 2024 bid extended its regeneration plans with the adjacent Île-Saint-Denis and Saint-Ouen-sur-Seine. The major urban project planned in these municipalities is the Athletes Village, and this site seems to be well chosen to fit the legacy and regeneration agenda. Saint-Denis is one of the poorest and youngest areas in France with low income, high unemployment and social exclusion, making this community one of the most disadvantaged areas in France. Although this area is in close proximity to inner Paris, the combination of limited opportunities, lack of proper training, institutional barriers, all prompted by systemic racism and multicultural, immigrant society, makes this area socially and economically stigmatised and neglected by "the mainstream life of the French capital" (O'Sullivan, 2019). When comparing all three bids, each of them emphasises the rejuvenation, regeneration and development of Saint-Denis together with major transportation upgrades to improve the accessibility and mobility of the residents. Looking at the location of major legacy projects in Paris and the character of the social structure, some parallels could be found between the French concept and the London 2012 Games, where the event was used as a catalyst for the regeneration of the East London boroughs—one of the most underdeveloped areas in the UK before the Games (see Davies, 2012; Evans & Edizel, 2017; London 2012 Candidate City, 2004).

Bids for 2012 and 2024 are much more detailed in terms of their alignment with long-term strategies, as they refer to specific documents on urban and transport plans. In particular, the latest bid declares full integration with long-term development agendas. This is of great importance, as this bid was fully prepared according to the recommendations of the Olympic Agenda 2020 and the New Norm mea-

sures. In the 2024 bid book, it has been claimed that the concept of the Games is perfectly aligned with the strategic development plans of Paris and the Paris Region (Paris 2024 Candidate City, 2016). One of them is the Paris Region strategic master plan for 2030 adopted in 2013, and acclaimed by the governments of France, the Paris Region as well as all relevant local authorities. In detail, the three territories will be mainly impacted by Games-related urban development projects (Plaine Commune, Le Bourget and the City of Paris), which also have complementary long-term planning strategies. Plaine Commune[5] is a central part of the event-led urban transformation. This is a public territory institution that comprises nine *communes* (i.a. Saint-Denis, Île-Saint-Denis, Saint-Ouen-sur-Seine), and the Olympic Games in 2024 are one of the flagship projects promoted by this entity to foster social, cultural and economic development of these areas, with respect to sustainable measures and practices (urban sustainability).

Sustainability and environmental protection are other themes strongly emphasised in each Paris bid book. At the time of the 2008 bid submission, both issues have started to gain much more widespread attention among the candidate cities and the Olympic Movement in general. But the spectrum of sustainability and



* It is a word stem and the word counts also include words such as: environmental, environmentally, etc.

Figure 1. Word counts in candidature files for each word/phrase in every edition

Source: own analysis.

[5] See more on Plaine Commune: https://plainecommune.fr/qui-sommes-nous/

environmental plans has varied between the bids, which can be demonstrated by a straightforward text analysis of three Candidature Files, the results of which are visualised in Figure 1.

The text analysis based on word counts manifests the rising importance of sustainability issues in the subsequent bid books; however, there is a significant increase in the concept of sustainability, which encompasses much broader topics, not only concerning the environment, but also economic and social aspects. Already in the 2008 bid, many ideas and projects regarding environmental protection were established. In the 2012 bid, sustainable development and environmental excellence emerged as key themes with a commitment to a sustainable legacy. In the vision for the 2012 Games, one of the pledges included "taking into full account environmental concerns and the need for sustainable development" and it was planned that "all Olympic projects reflect the desire to reduce the pollution and noise of transport and to limit the use and impact of car travel" (Paris 2012 Candidate City, 2004, p. 25, 33). There were very ambitious plans concerning the Olympic Village by setting "new benchmarks for sustainable development in an urban setting, and each new venue will incorporate advanced environmental technologies" (Paris 2012 Candidate City, 2004, p. 35). A very similar expression appears in the Paris 2024 bid, where the Olympic Village "will set a new benchmark for sustainable development and best practices" (Paris 2024 Candidate City, 2017, p. 24). In the latest bid for the 2024, sustainability and legacy are "at the core of its project" (The Paris 2024 Organising Committee for the Summer Olympic and Paralympic Games, 2021a) and are inextricably connected to each other. The Table of the Paris 2024 contents of Candidature File differs from the years 2008 and 2012, because it dedicates an individual point (3.6 in Paris 2024 Candidate City, vol. 3, 2017) entirely to sustainability plans. Sustainability and environmental excellence could be perceived as leitmotifs of the Paris 2024 Games with the statement that this event will constitute a benchmark for future international sport events and the sport movement (Paris 2024 Candidate City, 2016, p. 24). Moreover, the Paris 2024 Bid Committee received the ISO 20121 certificate (for the first time as a bidding city) by excelling in the following areas: social consultation, commitment to stakeholders, governance and legacy (Butler, 2017). In August 2021, the Organising Committee published a *Sustainability and legacy report* presenting the first results and the then status of the implementation of the sustainability and legacy strategy (The Paris 2024 Organising Committee for the Summer Olympic and Paralympic Games, 2021a). It should be highlighted that this strategy has been developed to embrace the United Nations' Sustainable Development Goals. Undoubtedly, the Paris 2024 event could be perceived as an exemplary event in the above areas, as it promises to deliver a carbon neutral event, minimise carbon and environmental footprint, use 100% renewable energy during the Games, establish a circular economy, provide certified power supply, clean mobility solutions, public trans-

port and environmentally friendly means of transport, biodiversity and water management (Paris 2024 Candidate City, 2017, pp. 83–89). These aspects reflect the challenges related to climate change and environmental protection that the modern world faces today. However, the overall evaluation of sustainability and legacy plans will only be possible once the event in 2024 is completed.

Since the development of professional and amateur sports, France and Paris have always had great traditions in holding international sporting events and possess a well-developed sporting and training base. Therefore, each bid proposed a relatively high percentage of existing venues, which automatically reduces the total costs of the event. The 2024 bid outperforms the rest of the bids with only two permanent venues to be newly built, the Olympic Aquatics Centre and Porte de la Chapelle Arena. The Athletes' (Olympic) Village is another strategic infrastructural project that will be delivered from scratch, being "a key part of the history of the Plaine Commune and the project to develop the area, a combined authority that brings together nine urban areas within the Seine-Saint-Denis department north of Paris" (The Paris 2024 Organising Committee for the Olympic and Paralympic Games, 2021b, p. 39). As part of the legacy plan, this project aims to transform an ex-industrial corner of the French capital and will add almost 2,000 new apartments (of which 25–40% are planned to be converted into social housing, depending on the town). Like the Athletes' Village, the construction of the Media Village will be one of the main urban legacies delivered, as this project is due to be newly built. After the Games, the Media Village will be converted into 1,300 homes located in the municipalities of Dugny, Le Bourget and La Courneuve (The Paris 2024 Organising Committee for the Olympic and Paralympic Games, 2022). The site will have extended connections to the city's public transit system. The new Pleyel transport hub will be created in the vicinity of the Village. Due to the Olympics, Paris public transport is expected to be upgraded in alignment with the existing transport network and the New Grand Paris Transport Plan. Among other major initiatives in the public transport network is the Grand Paris Express. This project is included in the Grand Paris Transport Plan, which will modernise existing public transport and bring more than 200 km of rail lines and 68 stations, extend existing lines and develop four new automated metro lines. In 2021, the construction works for the Athletes' Village, the Olympic Aquatics Centre, the Porte de la Chapelle Arena started (The Paris 2024 Organising Committee for the Olympic and Paralympic Games, 2022).

Finally, what should also be highlighted is that all Paris candidatures stand out with relatively strong public support. Over the last decade such cities as Rome, Hamburg or Budapest have withdrawn from the bidding procedure, because the idea of hosting the Olympic Games was rather unpopular among the public. Hamburg held a referendum, and the results turned down the aspirations to host the event. The level of public support, which in the case of Paris was kept relatively

high for several years, is a very important aspect of every bid, as the growing scale, size and scope of the Olympic Games with potential for urban and socioeconomic transformation have made this event an immensely complex and costly project over the last decades. Having a strong support from city residents and all French nation, it has undoubtedly underpinned the Games concepts and allowed the bid committee to submit interest into staging the event.

4. Discussion

On the one hand, each subsequent Parisian bid reflects dynamic changes and tendencies that can be observed in the modern world; among others, these are related to climate change, technological change or innovations. On the other hand, increasing public awareness of the staging of this event in terms of costs, its impacts, legacy and environmental concerns has led bid managers and city authorities to propose solutions, projects and plans that could meet the needs and expectations of residents. The Olympic Games in Paris in 2024 are used to facilitate metropolitan transformation and integrate urban governance in the entire Île-de-France region (Geffroy et al., 2021). The latest Parisian bid was not free from public protests criticising the Olympic project due to concerns about displacements of residents, schools and businesses (Pavitt, 2020), but at the time of bidding, the Candidature enjoyed relatively high public support (see Table 1). These concerns arise from the experiences of previous Olympic events, for example, in Sochi 2014 and Rio 2016, where many adverse impacts and legacies have been reported (see, e.g. Braathen et al., 2017; Chestin, 2014; Garcia & Moreira, 2017; Golubchikov, 2016). Therefore, a democratic and collaborative approach to urban governance should be established and include a wider representation of resident voices in order to minimise the distance between the promises of the bid books and their real implementation (Wolfe, 2022).

Paris has presented three ambitious projects and could be perceived as an example of using the potential of the Games for social inclusion, job creation, better public transport and an economic boost by highlighting these themes in each bid. But a comprehensive evaluation of these plans will only be possible a few years following the event. The global COVID-19 pandemic has caused turmoil in the preparation process, but organisers have taken significant steps to reduce costs. However, there is another challenge for the organisers: inflation. The Paris 2024 Organising Committee also promises to optimise the budget wherever possible (Houston, 2022), but at the time of writing this article the inflation is still a serious problem for a global and European economy.

One of the limitations of this study is that only Paris is taken as a unit of analysis, whereas there are other cities that have submitted their bids more than once. Since the 2000s, Tokyo and Rio de Janeiro bid for the Summer Olympic Games more than once and were elected as hosts, while Beijing was elected as a host for the summer 2008 and winter 2022 editions. In contrast, there are cities that bid a few times unsuccessfully (taking into account an Application City phase). One of the explanations could be that the nominations of host cities strictly followed the unwritten rotation rule, i.e. circulating Games around continents. Therefore, the Games were not awarded successively to cities on the same continent. This leads to the recurring question—why have cities kept bidding anyway? In the literature, it is evidenced that the Olympic bid process could be used as a leveraging resource for a city or nation in areas such as building national and local pride, global recognition or the formation of networks of stakeholders and coalitions (Bason, 2019; Bason & Grix, 2018, 2020). Thus, it can be concluded that this group of cities seeks a global promotion or socioeconomic and political leverage via participation in Olympic bidding despite the bleak prospects of being selected as a host city.

Conclusions

In each of the three attempts to hold the biggest sport mega-event worldwide, the French capital has presented very ambitious Games concepts, with a great emphasis on sustainable development and urban regeneration in the areas where such an intervention has been especially needed. The latest concept of the Paris 2024 Games is to be fully aligned with the recommendations of OA 2020 and the New Norm, which aim to make the event much more flexible, efficient and sustainable. However, there are also concerns among the local public if the Olympic Games will truly serve the local community and not repeat some of the negative effects from previous Olympic editions. Moreover, there are two aspects that add to the state of uncertainty among organizers. First, a health crisis due to the coronavirus pandemic and the economic turbulences are serious challenges for the organisers, especially in terms of budget and financial constraints. Second, the Russian invasion of Ukraine is a source of enormous geopolitical and economic instability and uncertainty all over the world. The year 2022 witnessed one of the highest inflation rates since decades in basically every country owing to the above calamitous events. There is still a lot of global uncertainty all over the world and many organisational challenges and pitfalls ahead, but undoubtedly the Olympic Games might serve as a tool for social and economic recovery for French capital in the post-pandemic world.

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Limiting meat consumption in the view of the students of the Poznań University of Economics and Business

Marceli Hązła[1] **Kamila Michowska**[2]

Abstract

The aim of the study was to examine the attitudes of students at the Poznań University of Economics and Business towards limiting meat consumption, in the context of global trends related to sustainable development. The two main identified areas of consideration are related to the impact of excessive meat production and consumption on human health and the state of the environment. The survey involved 296 respondents (61.8% women, 37.8% men, 0.4% other). Throughout the study, it was found out that more than half (51.4%) of the respondents limit their meat consumption. The gender of the respondents was important in this regard (63.4% of women and 31.3% of men limit their meat consumption). The most frequently cited reasons for limiting meat consumption include concerns for the environment (42.6% of respondents) and the desire to improve health and well-being (41.9% of respondents). Meat consumption decisions among 30.7% of respondents are not influenced by any arguments.

Keywords

- meat
- limiting consumption
- environmental concern
- health concern
- Poland

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[1] Poznań University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland, corresponding author: Marceli.Hazla@phd.ue.poznan.pl

[2] Poznań University of Economics and Business, al. Niepodległości 10, 61-875 Poznań, Poland, kamila.michowska@gmail.com

Introduction

According to a multitude of authors (Hickel, 2020; Jackson, 2017; Klein, 2018; Rogall, 2010), the global economy is facing serious challenges in addressing the need for sustainability. While much of the discussion to date has been about fossil fuels or the overuse of natural resources, as the topic of sustainability has entered the mainstream, it is also beginning to expand to include hitherto less popular issues – one of which is the issue of excessive meat consumption and its impact on the planet (Attenborough, 2021; Gates, 2021; Steel, 2020).

Currently, there are increasing claims about the negative impact of meat production and consumption on human health and the environment. Indeed, despite its high nutritional value, its excessive consumption contributes to the accumulation of a number of problems. For example, excessive meat consumption can lead to many diet-related non-communicable diseases. At the same time, animal husbandry and related meat production are responsible for a significant proportion of global carbon dioxide emissions and are extremely energy inefficient. In the face of the spread of lifestyle- and diet-related diseases of civilisation, as well as growing climate problems and the need to take sustainability into account, movements to reduce meat consumption, including vegetarian and vegan movements, are therefore an important initiative.

In the context of the above considerations, the aim of this paper is to examine the attitudes of students at the Poznań University of Economics and Business (PUEB) towards limiting meat consumption, in the context of global trends related to sustainable development. This will make it possible to compare their level of awareness and knowledge with the most important consequences of over-consumption of meat and other animal products, both from the point of view of human health and the environment. To this end, the following research questions were formulated:

- Do the PUEB students limit their meat consumption?
- Are there differences in limiting meat consumption between respondents from settlements of different sizes?
- Are there differences in limiting meat consumption between respondents of different genders?
- What are the main reasons for the PUEB students to limit their meat consumption?

The first part of the article presents an analysis of global trends relating to meat consumption. The second part aims to characterise the methodology and assumptions of the survey conducted among students of the Poznań University of Economics on their attitude towards limiting meat consumption. In the third part, the results of the survey are presented, together with an indication of possible

directions for its continuation. Finally, a discussion is held comparing the results of the survey with the research questions posed in the introduction.

1. Literature review concerning excessive meat consumption

Animal source foods (ASF), mainly meat, milk and eggs provide a high quality source of ingredients and micronutrients (especially iron, zinc and vitamin B12). Access to ASF is believed to have contributed to the evolution of the unusually large and complex human brain and social behaviour of homo sapiens (Milton, 2003). Throughout the 20th century, ASF have been a growing part of the food supply in western societies, as well as the developing ones (MacRae et al., 2005). From the early 1960s to around 2010, per capita consumption of milk in developing countries almost doubled, of meat tripled and of eggs increased fivefold (Burlingame et al., 2010). This was largely related to rising incomes and urbanisation influencing increased demand among many developing countries – particularly in those, where the consumption of animal products is a marker of social status (Pica-Ciamarra & Otte, 2009).

Despite their high nutritional value, however, excessive consumption of animal products (and meat in particular) contributes to the rise of certain problems. Firstly, excessive meat consumption can lead to diet-related non-communicable diseases such as obesity, cancer and heart disease (EAT-Lancet Commission, 2019). Secondly, meat production accounts for a sizable proportion of global carbon emissions and is extremely energy inefficient—for example, extracting one calorie from beef requires six times the input of feed and plant products (Gates, 2021). Consequently, although beef provides humanity with around 2% of calories, up to 60% of total arable land is indirectly used for its production (Attenborough, 2021).

Therefore, the excessive consumption of meat on a global scale raises two main sets of issues. Firstly, it is worth considering the impact of this situation on human health. While meat consumption in certain amounts is beneficial for maintaining a balanced diet (a maximum of 3.5% of calories are recommended to be extracted from meat), meat consumption currently exceeds recommended levels on a global scale significantly. Weekly meat consumption for an average adult should not exceed 98 g of red meat, 203 g of poultry and 196 g of fish (EAT-Lancet Commission, 2019), the equivalent of about 26 kg of meat per year. Meanwhile, in many developed countries, annual per capita meat consumption is a multiple of this value; in 2019, it was 153 kg in Portugal, 151 kg in the United States and 96 kg in Poland (Our World in Data, 2022). This translates into the rise

of the aforementioned problems related to poor diet and the resulting diseases of civilisation (Migdał, 2007). A comprehensive review of studies related to the health effects of excessive meat consumption suggests that the main problem in this regard is red meat (mainly beef and pork), the consumption of which should be reduced as far as possible (Richi et al., 2015; Mroczek et al., 2018). Therefore, although there is still no irrefutable consensus on this issue, the prevailing view in the literature is that meat consumption—particularly red and highly processed meat—should be reduced, which is the official position of the World Cancer Research Fund (2021) and the World Health Organisation (2015).

Secondly, meat production has a significantly negative impact on the environment. In a paper by Cole & McCoskey (2013), the authors demonstrated that the concept of the ecological Kuznets curve applies to meat consumption worldwide, where—up to a certain income level—meat consumption increases with GDP before starting to decline. However, most countries in the world are still before the inflection point of this curve. It is therefore predicted that, if no action is taken to reduce meat production, the area of land devoted to meat production will need to increase by 30–50% by 2050, contributing to a drastic decline in biodiversity (Machovina et al., 2015). Another important aspect is the CO_2 emissions associated with meat production. In 2013, animal husbandry accounted for 14.5% of total global carbon dioxide emissions (Gerber et al., 2013). Meanwhile, according to the model proposed by the IPCC, in the absence of action to reduce global CO_2 emissions, humanity will have used up all of its remaining 'carbon budget' by 2030, making it impossible to stop global warming at 1.5°C above the pre-industrial times (Rogelj et al., 2018). Exceeding this level will contribute to rising sea levels and warming and acidification of the oceans. Longer and more intense droughts will threaten crops, wildlife and freshwater resources (World Wide Fund for Nature, 2021). This, in turn, will be associated with intensifying losses to the global economy from climate change, which could reach up to US $1.9 trillion per year by 2100 (Sanderson & O'Neill, 2020). In addition to its high carbon footprint, meat also requires a huge amount of fresh water used in the production process. For example, producing 1 kg of beef involves the consumption of 14,500 litres of water (Hoekstra & Heek, 2017). Meanwhile, according to some projections, in the absence of a reduction in global demand for drinking water, the world's supply will be fully exploited before 2100, with the possibility of "severe drinking water shortages" (in developing countries in particular, but over time also in developed countries) "even leading to armed conflicts" (Meadows et al., 2004, pp. 69–71).

An additional, but more difficult to quantify reason for limiting meat consumption may also stem from moral motives. Ethical dilemmas related to animal husbandry date back to ancient Greece, where the views of Plato and Aristotle resonated most clearly. While Plato viewed the overconsumption of

meat mainly in economic terms (meat as a luxury leading to an unsustainable society, full of conflict and inequality, requiring more land and wars to acquire it) (Plato, 2015), Aristotle already considered animals as sentient beings, some of them even endowed with memory and imagination (Grabowska, 2014). Nevertheless, it was still morally justifiable to inflict suffering on them if there were tangible benefits for humans involved. Contrary to popular perception, St. Thomas Aquinas (Tomasz z Akwinu, 1985, p. 234) was also of a similar opinion, advocating only to refrain from excessive cruelty towards animals, i.e. inflicting suffering on them that was 'unjustified'. For the modern age, however, the key views proved to be those of Descartes, who, in accordance with his doctrine of "I think, therefore I am", drew the conclusion that animals, lacking the capacity to think, are merely (god-made) "machines", incapable of experiencing pain and suffering (Descartes, 1981, p. 65).

The objectification of animals and their reduction to the role of a resource has made it possible to get rid of the remorse associated with inflicting suffering on them, culminating, for example, in industrial poultry farms (up to 99% of the world's broilers and laying hens are reared under industrial conditions), where an average of 0.03 m^2 of space is available per hen (while it needs about 0.46 m^2 to lie comfortably) (Foer, 2013). In addition to this, due to genetic modification between 1935 and 1995, the weight of the average broiler increased by 65%, its lifespan shortened by 60% and its nutritional requirements decreased by 57% (Grabowska, 2014); as a result, up to 90% of them have visible bone disorders, contributing to chronic pain (Singer & Mason, 2012, p. 44). Industrial animal husbandry, involving the confinement of animals in cages or overly cramped enclosures, therefore seems increasingly unjustified and cruel. One of the important arguments cited by proponents of reducing meat consumption thus becomes the concept of 'default livestock', according to which animals should be raised in free-range conditions and fed with crop residues or food leftovers, which would mean that the number of farmed animals would have to be drastically reduced compared to industrial farming (Steel, 2021).

In the face of the spread of lifestyle- and diet-related civilisational diseases, growing climate problems and the need to integrate sustainability into economic policy, movements to reduce meat consumption, including vegetarian and vegan ones, are therefore an important initiative. While it would be highly unlikely (and even undesirable for health reasons) to completely abandon meat consumption on a global scale, a realistic task for humanity in the 21st century might be to limit its per capita production to a level that does not exceed recommended consumption, and to consider stopping the production of red meat, which has the highest carbon footprint and the lowest energy efficiency.

Therefore, it seems important to ask what level of consumer awareness exists on this issue. Until recently, calls for a reduction in meat consumption

were mainly associated with the environmental movement and did not really resonate. In this context, the observation that, from the 1950s until 2015, global meat production grew continuously, more than doubling in value during that time (Petrovic et al., 2015), can be considered significant. Less than a decade ago, the question asked by researchers was the following: "Is reducing meat consumption realistic?" For example, in Denmark, in a survey on the frequency of eating meat for lunch in 2011, the most frequently indicated answer was "5–6 times a week" (35% of respondents), and the results did not depend significantly on education (Dagevos & Voordouw, 2013). A 2018 survey in the United States, on the other hand, found that up to 66% of respondents overall were limiting their meat consumption to some extent; although, interestingly, there was a correlation with age, suggesting that the reduction in consumption was due to personal health concerns and possible medical recommendations, rather than environmental motives. However, meat consumption restriction was shown to be positively correlated with education (Neff et al., 2018). In Australia in 2019, up to 88% of respondents regularly consumed meat (the most common response chosen was to eat meat '4–6 times a week', which was the case for 40% of respondents), while only 29% were aware of the negative environmental impacts of animal farming. Furthermore, among those limiting their meat consumption, only 5% did so out of concern for the state of the planet (Marinova & Bogueva, 2019). A study conducted among Polish students (Borusiak & Kucharska, 2020) found that 42% of respondents limit their meat consumption. The most important reasons were concern for the environment (35% of respondents) and attitudes towards animals (32% of respondents). The majority of respondents (46%) were also aware of the negative environmental impact of industrial meat production. The main barrier was the opportunity cost of taking longer to prepare meat-free meals—more than 53% of respondents felt they did not have the time to do so. Financial barriers to switching to a meat-free diet were an issue for 39% of respondents.

Bearing in mind the issues raised so far, it is interesting to compare the negative effects (both on human health and the environment) of excessive meat consumption with the perception of this problem by PUEB students, who belong to an important group for the future implementation of sustainable development solutions in European Union Member States (European Commission, 2019). The present study is a somewhat elaborated version of the study conducted by Borusiak and Kucharska (2020), which did not address issues related to human health. Meanwhile, as demonstrated by Neff et al. (2018), concern for one's own health can sometimes be the most important motive. For this reason, the following part of this article focuses on the methodology and results of a survey on the opinions of students at the Poznań University of Economics and Business on limiting meat consumption, in the context of the aforementioned regularities.

2. Methodology

The study was conducted in the form of an online survey (Computer-Assisted Web Interview, CAWI) on the Google Forms platform, addressed to students of the Poznań University of Economics and Business, which took place between November and December 2021. The choice of the target group of the survey was based on two issues. Firstly, in light of the regularities cited earlier, it was decided that young and educated people—i.e. students—may be most important for the future of economic policy-making in EU member states. Secondly, due to the limited possibilities for obtaining responses and the pilot nature of the survey, the home university was chosen, which made it possible to use its own networks of acquaintances to distribute the questionnaires. In the future the study may be extended to include a bigger research sample from other Poznań universities, as well as other cities in Poland.

A total of 296 respondents took part in the survey, of whom 183 (61.8%) were female, 112 (37.8%) male and 1 (0.4%) other/ did not wish to specify gender. Due to the distribution method of the questionnaires, the sampling was random using the snowball method (Schroeder et al., 2013). In 2021, the survey population of PUEB students was 7619 (Uniwersytet Ekonomiczny w Poznaniu, 2021), which means that a sample size of N = 296 defines it at a confidence level of P = 95%, with a margin of error of α = 5.58% (Creative Research System, 2012). Data was processed using the MS Excel package, with particular emphasis on the utilisation of pivot tables when aggregating responses according to the variables under consideration.

The survey questionnaire consisted of nine single- and multiple-choice questions. The first two questions were metric in nature and related to place of residence and gender (the question on age was omitted due to the homogeneity of the study population in this aspect). The following questions referred to the impact of excessive meat consumption on human health and the environment as perceived by PUEB students. They asked about: frequency of meat consumption, types of meat consumed, limiting meat consumption, arguments for limiting meat consumption, perceptions of the impact of meat and meat-free diets on health, and perceptions of the affordability of meat-free diets.

3. Findings of the study

During the survey, the respondents were asked to specify the frequency with which they consume meat. Table 1 summarises their responses by gender. It can be seen that the results differ substantially between the genders, with the most

common answer chosen by women being '2–5 times a week' (46.5%) and by men 'more than 5 times a week' (51.7%). Among women, there was also an almost three times higher proportion of meat consumption 'less than once a month or never' (13.1%) than among men (4.5%).

Table 1. Frequency of meat consumption by respondents according to gender (in %)

Specification	Overall	Women	Men
Less than once a month or never	9.8	13.1	4.5
1–5 times a month	13.9	19.1	4.5
2–5 times a week	43.6	46.5	39.3
More than 5 times a week	32.7	21.3	51.7

Source: authors' own elaboration.

The size of the settlement of origin was chosen as a second criterion for the distribution of responses regarding the frequency of meat consumption (the place of residence was not asked, as most respondents probably lived in Poznań due to attending university there) (Table 2). It can be observed that the percentage of respondents consuming meat "less than once a month or never" remains relatively constant regardless of the size of the settlement of origin (between 8.0% and 11.1%). The situation is similar among respondents consuming meat 'more than 5 times a week', where their percentage oscillates between 31.0% and 36.5%. Slightly greater discrepancies appeared for those eating meat '1–5 times a month' (between 8.6% and 19.5%) and '2–5 times a week' (between 40.7% and 48.2%). However, the overall distribution of responses remains comparable regardless of the size of the settlement. It may therefore be concluded that the size of the place of origin is not as significant as gender when it comes to the frequency of meat consumption.

Table 2. Frequency of meat consumption by respondents by place of origin (in %)

Specification	Overall	Village	City of up to 50,000 inhabitants	City of 50–500,000 inhabitants	City of over 500,000 inhabitants
Less than once a month or never	9.8	9.5	8.0	11.1	11.1
1–5 times a month	13.8	10.8	19.5	16.7	8.6
2–5 times a week	43.6	43.2	41.5	40.7	48.2
More than 5 times a week	32.8	36.5	31.0	31.5	32.1

Source: authors' own elaboration.

In the next question, the respondents were asked to identify the types of meat they eat (Table 3). The most frequently chosen answers were poultry (85.1%) and fish and seafood (67.6%). Pork (63.0%) and beef (49.7%) were also frequently selected responses, confirming the greater attachment of consumers in Poland to eating pork compared to the average of EU countries (PKO Bank Polski, 2018).

Table 3. Percentage of respondents consuming specific types of meat (in %)

Type of meat	Percentage
Poultry	85.1
Fish and seafood	67.6
Pork	63.0
Beef	49.7
Venison	10.8
None	8.4

Source: authors' own elaboration.

The respondents were subsequently asked to state whether they limit their meat consumption. The majority of respondents agreed (51.4%), but the results differed sharply between the sexes (Table 4). 63.4% of women and only 31.2% of men limit their meat consumption. This means that with a survey sample close to the actual gender parity found in Poland (51.6% of women and 48.4% of men) (Polska w liczbach, 2021), only 47.8% of respondents would limit their consumption. However, this still means that the survey population limits meat consumption to a greater extent than the national average of 39% in 2021 (Filip, 2021).

Table 4. Percentage of respondents limiting meat consumption by gender (in %)

Specification	Overall	Women	Men
Limiting meat consumption	51.4	63.4	31.2
Not limiting meat consumption	48.6	36.6	68.8

Source: authors' own elaboration.

Table 5 shows the responses to the same question by size of the place of origin. The percentage of respondents limiting meat consumption usually oscillates slightly above 50% (except in cities of 50–500,000 inhabitants, where it is 48.1%). A more significant deviation from this pattern is characterised by the category of cities of up to 50,000 inhabitants, where the corresponding percentage was 57.5%.

The respondents were also asked to indicate which arguments influence their decision to reduce meat consumption (Table 6). The most frequently chosen answers

Table 5. Percentage of respondents limiting meat consumption by settlement of origin (in %)

Specification	Overall	Village	City of up to 50,000 inhabitants	City of 50–500,000 inhabitants	City of over 500,000 inhabitants
Limiting meat consumption	51.4	50.6	57.5	48.1	50.6
Not limiting meat consumption	48.6	49.4	42.5	51.9	49.4

Source: authors' own elaboration.

Table 6. Percentage of respondents limiting their meat consumption due to specific arguments (in %)

Type of meat	Percentage
Ecological/environmental aspects	42.6
Improving health and well-being	41.9
Desire to reduce animal suffering	38.0
None	30.7
Financial considerations	12.0
Other	3.6

Source: authors' own elaboration.

were—in line with the patterns presented so far—'ecological/environmental aspects' (42.6%) and 'improving health and well-being' (41.9%). The 'desire to reduce animal suffering' was also a fairly frequent response (38.0%); however, the decisions of 30.7% of respondents are not influenced by any arguments.

Finally, the respondents were asked to compare meat-free and traditional diets in terms of their impact on human health and affordability (Table 7). Although the majority of respondents (55.8%) do not have an opinion on the subject, the percentage of people who consider meatless diets to be healthier (33.4%) is three

Table 7. Respondents' opinions on meat-free and traditional diets (in %)

Opinion	Agree	No opinion	Disagree
A meat-free diet is healthier than a traditional diet	33.4	55.8	10.8
A meat-free diet is more expensive than a traditional diet	39.6	45.9	14.5
I can financially afford to go on a meat-free diet	60.8	21.3	17.9

Source: authors' own elaboration.

times higher than the percentage who disagree (10.8%). The situation is similar for their perceived affordability, with as many as 45.9% of respondents having no opinion on which diet is more expensive. However, 39.6% of respondents agree that a meat-free diet is more expensive than a traditional diet—almost three times the percentage of respondents disagreeing with this statement (14.5%).

The majority of respondents do not have an opinion on the price differences between meat-free and traditional diets, with as many as 60.8% believing that they could financially afford to switch to a meat-free diet. Only 17.9% of respondents disagree with this statement and 21.3% have no opinion.

Conclusions

The negative effects of excessive meat consumption affect both the state of the environment and human health, as evidenced by the review of existing research in this area in the first part of the article. There is a trend among a growing group of consumers to consciously reduce meat consumption, which may be due to concerns for both the state of the environment (Borusiak & Kucharska, 2020) and their own health (Neff et al., 2018).

Following on from the research questions formulated in the introduction, a study conducted among students at the Poznań University of Economics and Business showed that students limit their meat consumption to a greater extent (51.4% of respondents) than the national average (39%) (Filip, 2021). The size of the settlement of origin was not crucial in this respect – despite some deviations (57.5% of those limiting meat consumption in cities with up to 50,000 inhabitants and 48.1% in cities with 50,000–500,000 inhabitants), in most cases the percentage of those limiting meat consumption was close to the average value of the survey. However, significant gender differences could be observed—among women, as many as 63.4% of respondents limited their meat consumption, while among men it was only 31.2%. The most important reasons for the PUEB students to limit meat consumption were the desire to improve their own health and well-being (41.9%) and concern for the environment (42.6%). For the majority (60.8%) of respondents, switching to a meat-free diet would also not pose a financial problem.

It can therefore be concluded that there is a high level of awareness among the PUEB students regarding the harms of over-consumption of meat, so if the attitudees of students at most universities are similar, then limiting meat consumption to the recommended amounts should not present difficulties for younger generations. In the face of growing climate problems in the 21st century, this is good news because, as Hickel (2020) and Steel (2021) note, the current level

of meat production exceeds the regenerative capacity of the planet and should be reduced to a more sustainable level. However, the still high consumption of pork is of concern, with relatively higher levels of harm than lean meats such as poultry or fish.

These findings may be of relevance for future educational policies aimed at preparing society for the upcoming changes associated with the European Green Deal, which, according to this study, should take gender differences into account, emphasising other aspects that may be crucial for women and men respectively. For example, women might find the arguments around climate issues more important, while men might be more attracted to arguments around looking after their own health and fitness. Future research exploring disparities in meat consumption preferences among students could also take into account their differences in interests and opinions represented by the choice of university as well as variations between several cities in Poland, allowing to tailor the educational policies accordingly.

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