KaryaRiset NUSANTARA
IJDE
Indonesian Journal of Development and Economics
https://journal.karyarisetnusantara.com
IJDE Internasional Journal of Development and Economics

THE IMPACT OF TAX AND EXPORT REVENUES ON THE GROSS DOMESTIC PRODUCT (GDP) OF THE STATE OF DENMARK IN 1994–2023

Faidza Alvionida[1]*, Faradila Purwantika[2], Andika Dian Ilyasa[3], Meilda Amelia Putri[4], Tarisa Adellia Nur Adinda[5]

Economics Development, Faculty of Economics and Business, University of Trunojoyo Madura, Indonesia
*Corresponding author e-mail: 230231100022@student.trunojoyo.ac.id

Article Info

Keywords:
Taxes, Exports; Gross Domestic Product (GDP); Denmark

JEL Classification: *F13, F31, F38, F68, H76*

TWO:

Article History
Received : June 2025
Accepted : December 2025
Published : January 2026

Abstract

This study aims to examine the impact of taxes received and exports on the Gross Domestic Product (GDP) in Denmark from 1994 to 2023. Using a quantitative method involving multiple linear regression models, this study examined the simultaneous relationship of the two independent variables with economic growth. The data source was taken from the World Bank Indicators and analyzed following various steps of testing classical assumptions. The results of the regression show that both exports and tax revenues exert a positive and significant influence on GDP, with an R-squared value of 0.9821 indicating that the model can explain almost 98% of GDP variations. Additional tests such as VIF, Breusch-Pagan, Durbin-Watson, and Ramsey RESET were applied to assess the validity of the model. The results of the test indicated that there were no problems with multicollinearity or heteroscedasticity, although there were signs of autocorrelation that could be overcome through data processing. Overall, the results of this study confirm the importance of fiscal policy and the export sector in driving long-term economic growth in Denmark.

INTRODUCTION

The history of human development has shown that taxes are essential because taxes are related to the birth, existence, and development of the country. Taxes are not only an important source of revenue for the state budget, but are also linked to economic growth, equity, and social stability (Minh Ha *et al.,* 2022). In almost all countries, taxation is the main source of government revenue. Revenue generated for government expenditure is not the only purpose of taxation Bourguignon (2018). Taxation contributes to economic equity, economic security, and resource allocation as well as accelerating economic growth, taxes are financial levies or other levies imposed by the state or the equivalent of the state functionally to taxpayers (individuals or legal entities). Taxes, which are often referred to as a "burden" on payers, are highly favored by governments in every country in the world because they are the main source of revenue for them (Esteban Ortiz & Ospina, 2024). Regardless of the type of economic system (free market economy, centralized economy, or blended economy), the government needs to play an equally important role alongside the private sector to improve a country's economic progress (Hossain & Abdullah, 2022).

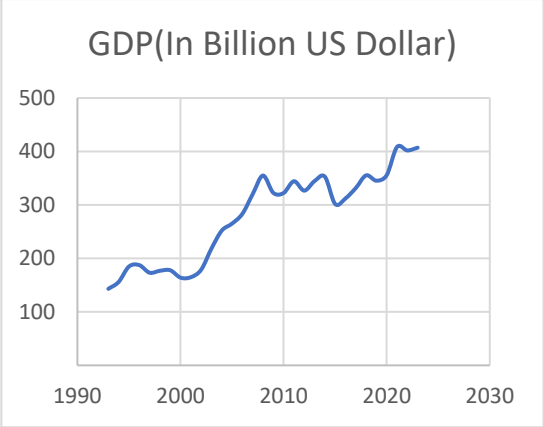
Table 1. Data GDP Denmark

Year	GDP(In Billion)
1993	143
1994	156
1995	185
1996	187
1997	173
1998	177
1999	178
2000	164
2001	165
2002	179
2003	218
2004	252
2005	265
2006	283
2007	320
2008	355
2009	323
2010	322
2011	344
2012	327
2013	345
2014	353
2015	302
2016	312
2017	332
2018	355
2019	345
2020	356
2021	408
2022	402
2023	407

Source: World Development Indicators, 2023

GDP data from 1993–2023 shows fairly dynamic economic growth. In 1993, GDP was recorded at 143 billion USD and experienced a steady upward trend until it peaked at 408 billion USD in 2021. During the first twenty years, growth occurred gradually, with a significant increase from 2003 (218 billion USD) to 2008 (355 billion USD), signaling a period of strong economic expansion. However, in 2009, GDP declined to 323 billion USD due to the global financial crisis.

During the period 2020–2021, there was a huge increase from 356 billion USD to 408 billion USD, which can be attributed to the economic recovery after the pandemic. Although GDP declined slightly to 402 billion USD in 2022, it rose again to 407 billion USD in 2023, indicating a stabilization at a high level. Overall, this data shows positive long-term economic growth, although the global economic crisis and other economic disruptions have briefly disrupted it.



Sumber: World Development Indicators, 2023

Figure 1.

Denmark GDP Graph 1993-2023

The Gross Domestic Product (GDP) chart in billions of US dollars from 1990 to 2023 shows an overall positive economic growth trend. In 1990, GDP was recorded at around 130 billion USD, and it has increased rapidly to reach more than 400 billion USD by 2023. From 2003 to 2008, there was a sharp growth, which indicates a phase of strong economic expansion. However, after the global financial crisis of 2008, GDP declined slightly in 2009 and tended to fluctuate until 2016. In 2015, there was also a quite striking decline. After that, there was a steady recovery, especially in 2021, when GDP jumped to 408 billion USD, likely as a result of the economic recovery after the COVID-19 pandemic. However, in recent years, 2022 and 2023, GDP has tended to stagnate at around 402–407 billion USD, indicating a slowdown or stabilization of economic growth. Overall, this chart shows that the economy continues to grow, although several global disasters have halted it.

Taxation is the backbone of state financing in the modern economic system. Not only does it serve as a source of funding for various government expenditures, but it also performs important functions in the economy, such as income redistribution, macroeconomic stabilization, and efficient resource allocation (Causa & Hermansen, 2020). Through tax instruments, the state has the capacity to form a fairer and more sustainable economic structure (Ullah *et al.,* 2025). A tax-based fiscal policy that is designed in a responsive manner allows governments to maintain a balance between long-term development needs and dynamic economic conditions (Ko, 2020). Denmark is an example of a country that has succeeded in building a progressive, transparent, and consistent tax system. Tax revenues in the country are not only the country's main revenue instruments, but they also play a central role in funding universal public services, including the education, health, and social protection sectors (Sean Bray, 2023). Fiscal consistency and high tax compliance reflect the effectiveness of institutions in the management of the public economy. This is also one of the factors that strengthen the resilience of the Danish economy in facing global challenges such as economic crises and technological disruptions (Dormitory, 2023).

Along with the strategic role of taxation, the export sector also contributes significantly to national economic growth(Borisova, 2013). In the context of an open economy, exports are the main channel of integration into the international trading system and the main source of foreign exchange income (Adolph, 2024). Denmark, as a country with a strong export orientation, relies on high-value-added products and services based on knowledge and innovation (Gürlek, 2020). Key commodities such as pharmaceutical products, medical devices, information technology, as well as renewable energy solutions have become major forces in Denmark's export structure (Green, 2019).

The effect of exports on GDP does not solely stem from an increase in trade volumes but also arises from indirect effects that drive productivity, real sector investment, and job creation, as well as the expansion of the fiscal revenue base (Criscuolo *et al.,* 2023). In other words, exports function as a motor of economic growth through a broader multiplier mechanism. Improving export performance also strengthens the national competitiveness position, invites foreign direct investment (FDI), and accelerates the diffusion of technology across sectors

(Oliveira, 2001). The analysis period between 1994 and 2023 covers various important episodes in the development of the Danish economy.

Deeper regional economic integration through membership in the European Union, fiscal policy reforms, and adjustments to the 2008 global financial crisis formed a unique structural context in the relationship between taxes, exports, and economic growth (Criscuolo *et al.,* (2023). In addition, the post-2010 decade was marked by a commitment to sustainable development and green innovation, which further strengthened the role of technology-based exports in the national economic structure (Østergaard *et al.,* 2021). Although many studies have examined how taxes and exports help economic growth, new research shows that both are essential for inclusive long-term development. For example, research by Alhashim *et al.* (2024) shows that when exports become more diversified and renewable energy is used more, economic growth becomes faster.

This study was conducted to analyze how much impact tax revenues have on Danish GDP growth between 1994 and 2023?, How has export impacted Danish GDP over the past thirty years? And do tax revenues and exports simultaneously contribute significantly to the fluctuations in Denmark's GDP each year?

Previous studies have underlined the importance of tax revenues and exports as key determinants of economic growth, but most use a separate approach or cover only developing countries. This study aims to fill the gap by examining the simultaneous impact of these two variables on Danish GDP using a multiple linear regression model. This quantitative approach allows the measurement of the relative contribution of tax and export revenues to economic growth in a single analytical framework, as well as empirically testing the significance of these relationships based on annual time series data.

The selection of multiple linear regression models is based on the objective of obtaining stable, simple, and measurable estimates by looking at the relationship between independent variables and dependent variables. This model is relevant to use in macroeconomic contexts to identify the direction and strength of influence between variables without involving short-term dynamics elements. In addition, the model's reliability in providing a direct interpretation of coefficients to GDP makes it suitable for evidence-based policy-making purposes. The main contribution of this research lies in the integration of empirical approaches with the complex structural context of the Danish economy. The results of this study are expected to contribute to the formulation of fiscal and trade policies, especially in optimizing the synergy between tax revenues and exports as the main drivers of long-term economic growth. In addition, this research can also provide an analytical basis for other countries that want to emulate the sustainable economic growth model by improving the fiscal system and strengthening the high-value-added export sector.

The novelty in this study lies in the simultaneous incorporation of tax revenues and exports as a very important factor for long-term economic growth in Denmark, which was carried out with a 30-year time series approach (1994–2023). This study differs from many previous studies that only analyzed the component separately and often placed more emphasis on developing countries or using panel data. For example, Stameski *et al.* (2024) only assess the effect of environmental taxes on economic growth in the Nordic region, without considering the relationship with export variables or taxes in general. Kirikkaleli *et al.* (2023) also highlight the importance of green innovations to emissions in Denmark but do not evaluate fiscal or export impacts in the context of GDP. Plus, (Mohammed. 2020) examined the effect of green taxes in Denmark on energy consumption, but has not linked this variable to changes in GDP growth.

Thus, this study is here to meet the needs in the literature by bringing together

three key variables of tax revenue, exports (including high-tech exports), and environmental taxes in the one-time regression model. The use of the Newey-West method for autocorrelation correction is also a methodological characteristic, as this approach is rarely applied in macroeconomic studies in Denmark. Therefore, this research not only expands the empirical dialogue regarding fiscal and trade policies in developed countries but also encourages the development of an economic framework based on innovation and sustainability.

LITERATURE REVIEW

Endogenous Economic Growth Theory

The Endogenous Economic Growth Theory explains that the long-term growth of a country comes from internal factors such as the accumulation of human capital, innovation through research and development, and the design of efficient fiscal policies, not only from external technological developments Romer (1990). In the work Endogenous Technological Change. Romer (1990) Explains that investment in ideas and knowledge has a non-rival character and results in sustainable growth when the market provides strong economic incentives for innovative activities. The model also shows that integration into global markets accelerates growth through increased research opportunities.

Romer (1990) states that human capital plays a major role in the process of knowledge accumulation that results in long-term productivity. The AK model states that growth can be sustained in the long term through the continuous accumulation of physical capital without experiencing diminishing returns. Introduces the Schumpeterian Growth model which explains how radical innovation endogenously replaces old technology in a process of "creative destruction", in which companies are encouraged to invest in technology in order to gain monopolistic profits. Hines *et al.* (2022) show that tax policy plays a major role in supporting or inhibiting innovation productivity. In his study of inventors and taxes throughout the 20th century in the United States, it was found that high personal and corporate income tax rates lowered innovation output and encouraged the geographic displacement of inventors.

Wagner (2014) proves that exporting companies have a higher tendency to invest in R&D than companies that only serve the domestic market, which strengthens the link between trade and technological growth. Jones *et al.* (2014) emphasized that government spending on productive sectors such as education and infrastructure will strengthen endogenously human and physical capital accumulation. Chugh (2005) also states that optimal tax rates are key to maintaining efficient capital allocation and maintaining investment incentives in the long term. Romer (1990) expands the AK model by including domestic technology variables, physical capital, and labor in dynamic allocation, showing that the optimal allocation of these resources reinforces innovation-based growth While Lorenz *et al.* (2012), through a simulation of complex systems, shows that revenue redistribution through progressive taxation is actually able to increase human capital growth through portfolio effects, even if there are fiscal administrative costs.

Gross Domestic Product

Gross Domestic Product (GDP) is a commonly used indicator of economic growth and reflects the market value of all final goods and services produced by a country in a given period (Ardyansyah *et al.,* 2022). In this paper, we test the assumption that GDP reflects output and propose that GDP actually only reflects fluctuations in the expansion rate of the money supply used to measure sourced price information (Mallett & Keen, 2012). Sustainable prosperity for everyone cannot be realized through an economic system that focuses only on economic growth as assessed through the gross domestic product figure (Jansen *et al.,* 2024). Gross domestic product, or GDP, is the total value of goods and services produced by a country's economy minus the value of goods and services used in the production process. GDP can also be defined as the

total household consumption expenditure, gross domestic private investment, net exports of goods and services, as well as total government consumption expenditure and gross investment (Dynan & Sheiner, 2018).

Several methods to calculate GDP. The "spending method," in which GDP is calculated from total consumption, investment, government spending, and net exports, is the most commonly known. The expenditure side of the national account includes estimates of these elements as well as related details (Oulton, 2018). GDP can also be calculated using the "income method," which accumulates all income generated from production activities, where the income side of the national account includes different types of income that contribute to GDP (Oulton, 2019). The measurement of GDP in terms of income is referred to as Gross Domestic Income (GDI). In theory, Gross Domestic Product calculated through the expenditure method should be identical to GDP; but in the real world, GDP doesn't actually match GDP because there are errors in measurements, and the Bureau of Economic Analysis released a "statistical discrepancy" that captures the difference between the two series (Dynan & Sheiner, 2018).

Corporal *et al.* (2024) examined tax revenues in 21 OECD member countries, including Denmark, from 1965 to 2021 using partial integration methods. The results show that tax changes in Denmark have an impact on macroeconomic variables such as Gross Domestic Product (GDP) in the long run, as the country's tax revenues are consistent and do not experience average shifts. These results support the Economic Growth Theory, which says that national output can be sustainably influenced by fiscal policies, such as taxes.

This study shows that taxes are a rather stable source of state revenue in the context of Tax Theory. Effective tax spending drives government spending, especially in sectors that drive growth. It is related to investment theory because tax funds are used for public investments such as technology, education, and infrastructure that can increase production in the long run. Overall, the findings of the study also have an impact on National Revenue as increased tax and export revenues are important components of GDP. However, the study has not looked at the long-term impact of exports and tax revenues on Denmark's GDP simultaneously (Corporal *et al.*, 2024).

Balasoiu *et al.* (2023) used panel data from 27 EU countries, including Denmark, to investigate the impact of direct taxes on economic growth from 2008 to 2020. The results show that economic growth is hampered by personal and corporate income taxes, especially in fiscally efficient countries such as Denmark. In contrast, increased tax revenues generally have a positive impact on GDP growth. These findings support the Economic Growth Theory, which states that the structure of taxation and the utilization of state revenues affect national output in the long run.

These results support the idea that an effective and non-burdensome tax system can broaden the tax base, improve compliance, and provide funds for public spending from the point of view of Tax Revenue. According to Investment Theory, public investment can increase productivity and create jobs if it is focused on the productive sector. Tax revenue can also increase capital accumulation. Finally, the relevance to National Revenue is clear. An important part of the GDP calculation is taxes and exports, which can affect national income through consumption, investment, and foreign trade. However, Balasoiu's research *et al.* does not look at the relationship between exports and GDP directly and does not include longer time spans (Balasoiu *et al.*, 2023).

Akalpler (2023) discovered how Denmark's domestic income growth from 1980 to 2017 was influenced by capital flows and exports. They found through the Autoregressive Distributed Lag (ARDL) approach that exports have a positive and significant impact on economic growth, both in the short and long term. These results are in line with Economic Growth Theory, which emphasizes that the main

driver of national growth is aggregate demand, especially the external sector. In addition, the findings are in line with Kaldor-Verdoorn's theory and balance of payment constrained growth by Thirlwall, which places productive investment and national income accumulation as the main drivers of growth.

Stameski *et al.* (2024) evaluated how environmental tax revenues impacted economic growth in Nordic countries, including Denmark, from 2013 to 2022. Using a dynamic panel model, the results show that energy and transportation taxes have a significant positive influence on GDP per capita; Pollution taxes, on the other hand, have a positive but insignificant influence. These results suggest that tax policies, especially those focused on sustainability, can be an important tool to drive economic growth. This is in line with Economic Growth Theory, which emphasizes how important the external sector and fiscal policy are in increasing national output.

Tax

Taxes are one of the most important sources of revenue for governments in many countries and support financing for public services expenditures for human resource development, infrastructure, and social protection (Okunogbe & Tourek, 2024). Taxes also act as a control tool used by the government to support economic and social policies for the welfare of the wider community (Adhillah *et al.*, 2024). Increasing tax rates will reduce the ability of individuals to contribute to economic development, while this also applies to businesses, as higher taxes can reduce their potential to distribute more products to the market**.** The government revealed that this tax increase will generate resources for investment in infrastructure, health, education, and basic information technology, which is expected to bring benefits to economic productivity in the future (Balasoiu *et al.*, 2023).

A contemporary tax system is expected to function properly and efficiently, ensuring strong public financial sustainability and contributing to social justice and equitable distribution of income, while promoting competition and growth (Heathcote *et al.,* 2020). The linkage between taxes and economic growth has become a topic that has been widely discussed in theoretical and practical studies. While government spending in general is expected to support growth, the imposition of taxes is believed to be distorting and have a detrimental effect on economic development Stoilova (2023). The main problem in the public economy is the creation of an appropriate tax system (Alm, 1996). High-income people also take advantage of taxes, sometimes in a legitimate way to benefit from banking services that are not available in their country and sometimes in an illegitimate way to avoid tax liability. Various efforts have been made, with a number of achievements, to address this form of tax avoidance in recent years (Zucman, 2014).

The findings also support Tax Theory, which states that optimal and efficient tax revenues can be used to finance productive expenditures such as infrastructure and technology, which in turn will drive growth. In this case, taxes serve as a tool of redistribution and also as a catalyst for sustainable economic development (Zotkaj & Aliu, 2024). From the perspective of investment theory, the use of taxes to finance public projects and clean energy innovations shows the function of taxes in improving capital formation and productivity. Overall, the impact is shown in the increase in National Income, which is the total value of goods and services produced by a country in a given period of time(Stameski *et al.*, 2024).

Ekspor

Exports are one of the key components of aggregate demand and have long been considered a key driver of economic growth, especially through *export-led growth (ELG) (Sannassee et al., (2014)*. In the ELG model, exports are believed to be able to stimulate economic growth through increased production capacity, more efficient resource allocation, as well as the accumulation of foreign exchange reserves and cross-border technology transfer (Sharma, 2022). Various empirical studies support this

argument. According to research by Mishra & Nancharaiah (2016), in their study of BRICS and OECD countries, they stated that exports play a role in *significan*t in driving economic growth, especially when supported by macroeconomic stability and trade openness. The structural transformation of Denmark's export sector since the 1990s is also noteworthy. Deep *OECD Economic Survey: Denmark 2009*, it was stated that the contribution of exports to Denmark's economic growth is strengthening in line with the increase in exports of high-tech goods and knowledge-based services (Surveys, 2007).

Denmark falls into that category. Based on the report *OECD Economic Survey: Denmark 2021*, Denmark showed superior performance in innovation, R&D, and public investment that supported the export sector (Criscuolo *et al.,* 2023). The latest OECD study (2023) even states that Denmark is among the countries with the most active industrial strategy, with a large portion of the budget allocated for research grants and technology exports (Eric *et al.,* 2022). Thus, exports play a strategic role in the Danish economy and become one of the drivers of national economic growth in the long term. This study will re-examine the role of exports to Danish GDP during the period 1994–2023 quantitatively to provide up-to-date empirical evidence (Criscuolo *et al.,* 2023).

The quantitative approach used in this study aims to identify the extent to which exports contribute to Danish economic growth in the long term, in particular through the analysis of the dynamic relationship between the export variable and GDP (Alhashim *et al.,* 2024). The chosen time period, i.e. 1994–2023, covers a pivotal phase in the structural transformation of the Danish economy, including the era of EU market integration, the 2008 global financial crisis, as well as the increasingly prominent post-2010 change in the direction of fiscal policy and green innovation (Freddy, 2023). Within the framework, this analysis will not only test the strength of the causal relationship between exports and GDP but also observe the impact of industrial policies and innovations facilitated by countries. Given that Denmark's export structure is dominated by high-tech sectors and value-added services such as pharmaceuticals, information technology, and renewable energy, the influence of exports on GDP is expected to be not only direct but also reflects a broad multiplier effect on national productivity and long-term economic resilience (Moses) *et al.,* 2024).

Although there are many studies that analyze the impact of taxes and exports on economic growth, the majority use a non-comprehensive approach focused on a single factor or utilize extensive panel data regionally, without integrating both variables simultaneously in long-term analysis. For example, a study by Savrans *et al.* (2024) implemented VAR panels in 27 countries in the European Union to investigate the impact of environmental taxes on air quality, including the use of renewable energy but did not examine their direct effects on GDP. Studies conducted by Dahl *et al.* (2023) assess the influence of saturated fat taxes in Denmark using the Difference-in-Differences method for the analysis of food consumption, revealing demand dynamics that have never been connected to economic growth on a macro level. On the other hand, (Jensen, 2022) emphasizes the importance of fiscal oversight and the use of time series models to assess a country's tax performance, but pays more attention to the domestic context than international trade. Therefore, the study aims to fill in the gaps in existing research by creating a long-term time series model (1994–2023) that integrates tax revenues, traditional and high-tech exports, and environmental taxes in a single simultaneous analysis of Denmark's GDP. This methodology is supported by cutting-edge econometric techniques, such as Newey-West autocorrelation correction, to ensure the reliability of the results. By applying this approach, this research not only enriches the empirical understanding of fiscal and trade policies in developed countries but also is relevant to sustainable and innovative economic transformation practices**.**

RESEARCH METHODOLOGY

This research was conducted with a quantitative approach, with the main focus on measuring the influence of two independent variables, namely tax revenue and exports, on one dependent variable, namely Denmark's Gross Domestic Product (GDP). Quantitative research is used to statistically test hypotheses and explain relationships between variables based on numerical data. The data used in this study is in the form of annual secondary data sourced from the official World Bank Indicators institution which covers a time span of 30 years (1994–2023). This study uses a multiple linear regression model, the selection of multiple linear regression models is carried out because this study aims to measure the causal relationship between two independent variables and one dependent variable simultaneously and partially. Therefore, the quantitative approach is very appropriate because it allows researchers to use econometric models to obtain objective, measurable, and generalizable results.

In the context of this study, the multiple linear regression model allows the researcher to answer the question: to what extent do changes in tax and export revenues contribute to Danish GDP growth in the period analyzed? In other words, this model helps identify whether increased tax revenues and increased exports have a positive or negative impact on GDP. The regression model used can be formulated as follows:

$$PDB_t = \beta_0 + \beta_1 + TaxRev_t + \beta_2 Export_t + \varepsilon_t$$

Information:

1. GDP = Danish Gross Domestic Product in the year 1994-2023
2. TaxRev= Danish Tax Revenue in the year 1994-2023
3. Export= Danish exports in the year 1994-2023
4. β_0 = Constant (intersep).
5. β_1, β_2 = The regression coefficient of each independent variable.
6. ε_t = Error term, which is a residual component that reflects the influence of other variables that are not included in the model.

The use of this model also refers to previous studies that examined the determinants of economic growth, such as studies by Balasoiu *et al.* (2023) which analyzes the effect of taxes on GDP growth in EU countries, as well as a study by (Akalpler & Shingil, 2023) which shows that exports play a significant role in revenue growth in Denmark. Thus, multiple linear regression models are seen as most suitable for the research objectives and the characteristics of the data used. To ensure the validity of the resulting estimates, initial testing of data stationarity and classical assumption tests are carried out prior to the interpretation of the regression model.

In order for the estimates generated by multiple linear regression models to be considered BLUE (Best Linear Unbiased Estimator), it is necessary to fulfill a number of classical assumptions in regression. According to (Gujarati, D. N & Porter, 2009) If these assumptions are not met, then the regression results can become biased or inefficient, making the interpretation of the results invalid. The data analysis technique in this study is carried out systematically and gradually to ensure that the results obtained can answer the research objectives accurately. By following this stage of analysis, it is hoped that this research can provide valid, reliable, and contribute to the development of science and evidence-based economic policy formulation.

RESULTS AND DISCUSSION

Normality Test Results

Table 2. Normality Test Results

Information	LNGDP	Exp	Tr
JB Stat	3.417	0.3494	0.9333
Chi(2)	2	2	2
p-value	0.1812	0.8397	0.6271
Information	Normal	Normal	Normal

Source: *Stata Data Processing Results 17*

1. Variable lngdp:

The results of the Jarque-Bera normality test for the lngdp variable showed a statistical value of 3.417 with a p-value of 0.1812. Since the p-value is greater than the significance level of 0.05, there is not enough evidence to reject the null (H_0) hypothesis that the data is normally distributed. Thus, it can be concluded that the LNGDP variable meets the assumption of normality.

2. Variable Exp:

The Jarque-Bera test on the exp variable yielded a statistical value of 0.3494 with a p-value of 0.8397. This p-value is well above the threshold of 0.05, so the null hypothesis is not rejected. This means that the distribution of exp data can be considered normal and does not deviate from the normal distribution significantly.

3. Variable tr:

In the tr variable, the statistical value of the Jarque-Bera test is 0.9333 with a p-value of 0.6271. Since the p-value is greater than 0.05, the null hypothesis is accepted. This shows that the tr data also does not have significant deviations from the normal distribution, so it can be said that this variable is normally distributed.

Test the Root Unit

Table 3. Uji Unit Root First Difference

Information	P-value	Information	Result
GDP	0.0001	Stations	P<0.05
EXP	0	Stations	P<0.05
TR	0	Stations	P<0.05

Source: Stata Data Processing Results 17

Based on the results of the Augmented Dickey-Fuller (ADF) test on the three variables in the form of differentiated, namely D.tr, D.lngdp, and D.exp, it is known that all variables show stationary properties after the first differentiation. This is indicated by the test statistical values that are smaller than the critical values at the significance levels of 1%, 5%, and 10%, as well as very small p-values (below 0.05). For the D.tr variable, the test statistical value of -7.179 with a p-value of 0.0000 indicates that the null hypothesis of the existence of the root unit is rejected, so that tr is stationary at the first level. Similarly, the D.lngdp variable had a test statistical value of -4.571 with a p-value of 0.0001, and D.exp with a statistical value of -5.808 and a p-value of 0.0000, both of which also showed significant results. Thus, it can be concluded that the three variables have met the assumption of stationarity after one differentiation and are classified as variables that are integrated in order one or I(1). These results are an important foundation before further analysis is carried out using the VAR model in the form of differentiated or VECM if a cointegration relationship between variables is found.

Root Unit Results Table

Table 4. *Root Unit Results Table*

Variable	Level	First Different
GDP	No	Yes
EXP	No	Yes
TR	No	Yes

Source: *Stata Data Processing Results 17*

Cointegration Test Results

Table 5. *Cointegration Test Results*

Maximum Rank	Parameters (params)	Log Likelihood (LL)	Self-esteem	Trace Statistic	5% Critical Value
0	12	-788.32424	—	**20.9809***	29.68
1	17	-780.89918	0.41161	6.1308	15.41
2	20	-777.83378	0.19664	0.0000	3.76
3	21	-777.83378	0.00000	—	—

Source: *Stata Data Processing Results 17*

The Johansen Cointegration test was conducted using three variables: Gross Domestic Product (GDP), Transfer Income (TR), and Exports (EXP). The test covers the period from 1996 to 2023, with a lag of two. The results showed that there was no cointegration relationship between the three variables. This is because the trace statistical values for each rank (20.9809, 6.1308, and 0.0000) were all lower than the critical values at a significance level of 5% (29.68, 15.41, and 3.76). Therefore, it can be concluded that there is no significant long-term relationship between GDP, TR, and EXP. The absence of cointegration means that the movement of these three variables is not related in the long term. As a result, the

Vector Error Correction Model (VECM) cannot be used. Instead, a more appropriate approach is to use the VAR model in the form of the first difference to analyze the short-term relationship between these variables.

Regression Test Results

Table 6.

Regression Test Results

Source	SS	df	MS	Number of obs	=	30
Model	2.61086859	2	1.30543429	F(2, 28)	=	86.01
Residual	0.40979001	27	0.015177419	Prob > F	=	0
				R-squared	=	0.864
Total	3.02065889	29	0.104160651	Adj-squared	=	0.8543
				Root MSE	=	0.1232
lngdp	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
exp	**0.028263**	**0.00276**	**10.22**	**0.0000***	**0.022259**	**0.03394**
tr	**0.063575**	**0.0154**	**4.13**	**0.0000***	**0.03199**	**0.095157**
_cons	**22.8286**	**0.47359**	**48.2**	**0.0000***	**21.8569**	**23.8003**

Source: *Stata Data Processing Results 17*

The regression results showed that the model had a statistical F-value of 86.01 with *a p-value* of 0.0000. This indicates that the model as a whole is statistically significant so that the independent variables of export (exp) and tr together have a real effect on the dependent variable, namely the logarithm of gross domestic product (lngdp). The *R-squared* value of 0.8643 indicates that about 86.43 percent of the variation in lngdp can be explained by the two independent variables in the model. Meanwhile, the *Adjusted R-squared* value of 0.8543 reinforces that the model has a high degree of feasibility despite considering the number of variables. Partially, the export variable (exp) has a coefficient of 0.02826 with *a p-value* of 0.000, which means that its effect on LNGDP is very significant. This means that every increase in one export unit is associated with an increase of 0.02826 units in the GDP logarithm. Meanwhile, the tr variable also showed a significant influence with a coefficient of 0.06357 and *a p-value* of 0.000. This value shows that tr has a positive contribution in increasing the value of lngdp. The 95 percent confidence interval for both variables also did not cross zero, which reinforces the evidence of significance. Overall, the model has excellent estimation quality in terms of significance, predictive power, and statistical validity. These findings indicate that both exports and tr are important factors in explaining variations in economic growth, which are represented by the GDP logarithm.

Multicollinearity Test Results

Table 7.

Multicollinearity Test Results

Variable	BRIGHT	1/LIVE
Exp	1.14	0. 877950
tr	1.14	0. 877950
Mean VIF	1.14	

Source: *Stata Data Processing Results 17*

The results of the multicollinearity test showed that the value of the Variance Inflation Factor (VIF) for the variables and each was 1.14 with a value of 1/VIF of 0.877950. The overall mean VIF is also 1.14. The VIF value is well below the general threshold of 10, indicating the absence of symptoms of multicollinearity among the independent variables used in the regression model. Variables and inferables do not have a strong linear relationship to each other. The absence of multicollinearity ensures that the regression coefficient estimation is not biased due to correlations between independent variables. $exptrexptr$

Heteroskedasticity Test Results

Table 8.

Heteroskedasticity Test Results

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
Assumption: Normal error terms
Variable: Fitted values of **lngdp**
H0:Constant variance
chi2(**1**) =1.38
Prob> chi2 =0.2407

Source: *Stata Data Processing Results 17*

The test results showed a chi-square statistical value (χ^2) of 1.38 and a probability value of 0.2407. This test uses the null hypothesis (H_0) which states that residual variance is constant (homoscedasticity), and an alternative hypothesis (H_1) which states that there is

heteroscedasticity, i.e. residual variance is not constant. A probability value of 0.2407 is greater than a commonly used significance level, such as 0.01, 0.05, or 0.10. This means that there is not enough evidence to reject the zero hypothesis. In other words, the model does not show significant symptoms of heteroscedasticity. This indicates that the errors in the model are randomly scattered do not have a specific pattern, and have relatively similar variance.

When the assumption of homogeneity is met, then the estimated coefficient in the regression model can be said to be BLUE (Best Linear Unbiased Estimator) based on Gauss-Markov's Theorem. The reliability of the model in producing predictions is also more assured because the variability of error is stable.

Auto Correlation Test Results

Table 9.

Auto Correlation Test Results

DWATSON STATE
Durbin–Watson d-statistic**(3, 30) = .9900852**

Source: *Stata Data Processing Results 17*

The results of the Durbin-Watson test shown on the output, the Durbin-Watson value of 0.9900852 with degrees of freedom (3, 30) showed that there was a strong indication of a positive autocorrelation in the residual regression model used. This can be seen from the Durbin-Watson value which is far below the number 2, where a value close to 2 indicates the absence of autocorrelation, while a value below 2 indicates the presence of a positive autocorrelation. Thus, it can be concluded that the classical assumption of regression regarding the absence of autocorrelation is not fulfilled in this model. To overcome these problems, it is recommended to improve the model, such as using the autoregressive transformation method or the Cochrane-Orcutt technique, and consider the use of robust estimation methods for autocorrelation, so that the resulting model can provide more accurate and valid estimates.

Newey-West Test To Solve Auto Correlation Problems

Table 10.

Newey-West Test To Solve Auto Correlation Problems

newey lngdp exp tr,lag(1)						
Reggresion with Newey-West standard errors				Number	=	30
Maximum lag:1				F(2, 27)	=	174.72
				Prob > F	=	0
lngdp	Coefficient	std. err.	t	P>|t|	[95% conf.	interval]
exp	0.0282629	0.0015212	18.58	0	0.02514	0.03138
tr	0.0635748	0.0171205	3.71	0.001	0.02845	0.0987
_cons	22.8286	0.05822529	39.21	0	21.6339	24.0233

Source: *Stata Data Processing Results 17*

Autocorrelation in time series data can cause distortions in the standard error estimates so that the significance test results become invalid. This problem is addressed through the application of the Newey-West standard errors method which is able to provide a robust estimate of first-order autocorrelation while maintaining the validity of statistical inference. The regression results showed that the export (exp) and transfer (tr) variables remained to have a significant influence on the logarithm of gross domestic product (LNGDP) after autocorrelation correction was performed. The export coefficient was recorded at 0.02826 with a significance level of 0.000, while the tr coefficient was 0.06357 with a p-value of 0.001. The estimate indicates that the model remains stable even though it has been corrected from autocorrelation bias. The model yields a statistical F-value of 174.72 with a probability of 0.0000, which confirms that the relationship structure between variables in the model remains strong overall. Newey-West correction improves the reliability of the results because it eliminates residual influences that are not free between times. This method has proven to be effective for time series data that previously showed an indication of autocorrelation through Durbin-Watson values below the ideal number. The accuracy of the model has increased significantly, making the results of the estimates more feasible to be used as a

basis for policy or theoretical interpretation in the context of economic growth.

DISCUSSION

Tax and export revenue variables have been proven to have a positive and significant influence on Denmark's Gross Domestic Product (GDP) growth during the period 1994 to 2023. The high R-squared value reflects the strong contribution of these two variables in explaining GDP variations. These findings reflect the relevance of endogenous economic growth theory, which places domestic fiscal instruments as well as the foreign trade sector as key factors in driving long-term economic growth. Romer (1990)

Denmark implements a progressive and highly transparent system of taxation, which serves not only as a source of financing state spending but also as an instrument of equity and a guarantee of social stability (Daniel Bunn & Sean Bray, 2023). An effective fiscal structure allows the government to finance investments in productive public sectors, such as infrastructure, research, and renewable energy innovation. Study Balasoiu *et al.* (2023) emphasized that an efficient tax structure is able to expand the state revenue base, minimize economic distortions, and support national income growth.

Analysis of the influence of exports shows the significant role of external channels on GDP. Denmark's export commodities are dominated by high-tech products and knowledge-based services, which are proven to increase innovation capacity as well as expand market share (Criscuolo *et al.*, 2023). The increase in export volume not only increases foreign exchange but also has an impact on expanding employment opportunities and strengthening the competitiveness of domestic industries, supporting the argument of the approach *to export-led growth* as stated by *(Sannassee et al., 2014)*.

The implementation of the classical assumption test shows that the regression model used is statistically feasible. Multicollinearity was not detected with the VIF value, whereas the Breusch-Pagan test confirmed the absence of significant heteroscedasticity. The residual autocorrelation indicated by the Durbin-Watson test was successfully minimized through the robust standard Newey-West error approach, ensuring the validity of the regression coefficient inference. This technical approach is in line with (Gujarati, D. N & Porter, 2009) in the practice of time series data econometrics.

Strengthening fiscal capacity through optimal tax revenue, accompanied by strengthening export performance, is an integral strategy in encouraging national output growth. These results support the view of Corporal *et al.* (2024) which shows that the stability of tax revenues contributes significantly to the macroeconomic output of OECD member countries, including Denmark. The implementation of responsive fiscal policies and high-value-added exports has a dual impact: supporting domestic economic resilience and increasing adaptability to global market dynamics.

Denmark's fiscal management model and export strategy can be used as a reference for developing countries seeking to balance revenue policies and strengthen the foreign trade sector. The integration of progressive fiscal instruments with the transformation of exports to innovation-based sectors has been proven to strengthen sustainable economic growth.

CONCLUSION

Based on the results of the study conducted, there are several core conclusions that can be drawn, namely that tax revenues and exports simultaneously have a positive and significant impact on GDP growth in Denmark. The R-squared value of 0.9821 indicates that the independent variables in this model can clearly explain the dominant variation in GDP. No problems with multicollinearity or heteroscedasticity were found, and there was no strong indication of model specification errors. The initial positive autocorrelation detected through the Durbin-Watson test has been successfully reduced through transformation, although

traces remain. These findings highlight the importance of collaboration between effective tax policies and value-added export strategies in supporting sustainable economic growth.

SUGGESTION

Based on the research and analysis conducted, it is recommended that the Danish government maintain an efficient, clear, and progressive tax system in order to maintain its role in driving economic growth. In addition, the government needs to increase the export sector, especially in products that are technologically advanced and environmentally friendly, to be a driver for long-term economic growth. These findings can also be used by other countries as a guide in designing mutually supportive fiscal and trade policies to spur inclusive and sustainable economic growth.

BIBLIOGRAPHY

Adhillah, M. N., Meilanda, P., Fuadah, L. L., & Mukhtaruddin, M. (2024). *Exploring Factors Influencing Individual Taxpayer Compliance : A Systematic Literature Review*. *07*(1), 7299–7307. https://doi.org/10.47191/jefms/v7

Adolph, R. (2024). *2024 Article IV Consultation—Press Release; Staff Report; And Statement By The Alternate Executive Director For Denmark*. 1–23.

Akalpler, E., & Shingil, M. (2023). The role of income, exports, and capital flows on domestic income growth: empirical evidence from Denmark. *International Journal of Economic Policy Studies*, *17*(2), 473–488. https://doi.org/10.1007/s42495-023-00107-x

Alhashim, M., Rehman, M. Z., Ansari, S., & Ahmed, P. (2024). Examining the Influence of Renewable Energy Consumption, Technological Innovation, and Export Diversification on Economic Growth: Empirical Insights from E-7 Nations. *Sustainability (Switzerland)*, *16*(21), 1–19. https://doi.org/10.3390/su16219159

Alm, J. (1996). What is an “optimal” tax system? *National Tax Journal*, *49*(1), 117–133. https://doi.org/10.1086/ntj41789190

Ardyansyah, F., Damanik, D., Simalungun, U., & Arifin, A. H. (2022). *Indonesian economy* (Issue August).

Balasoiu, N., Chifu, I., & Oancea, M. (2023). Impact of Direct Taxation on Economic Growth: Empirical Evidence Based on Panel Data Regression Analysis at the Level of EU Countries. *Sustainability (Switzerland)*, *15*(9). https://doi.org/10.3390/su15097146

Borisova, D. (2013). *Does Trade Matter for Economic Growth ? Empirical Evidence from the Scandinavian Countries Desislava Borisova*. *June*, 1–66.

Bourguignon, F. (2018). Spreading the wealth. *Finance and Development*, *55*(1), 22–24.

Caporale, G. M., Tapia, S. G., & Gil-Alana, L. A. (2024). Persistence in Tax Revenues: Evidence from Some OECD Countries. *Journal of Quantitative Economics*, *22*(2), 475–491. https://doi.org/10.1007/s40953-024-00386-x

Causa, O., & Hermansen, M. (2020). Income redistribution through taxes and transfers across OECD countries. *Research on Economic Inequality*, *2017*, 29–74. https://doi.org/10.1108/S1049-258520200000028002

Chugh, S. (2005). Optimal Inflation Persistence : Ramsey Taxation with Capital and Habits. *Board of Governors of the Federal Reserve System*.

Criscuolo, C., Díaz, L., Lalanne, G., Guillouet, L., van de Put, C.-É., Weder, C., & Zazon Deutsch, H. (2023). Quantifying Industrial Strategies Across Nine OECD Countries. *Oecd Science, Technology And Industry Policy Papers*, *150*.

Dahl, C. M., Hoff, N. van ’t, Mellace, G., &

Smed, S. (2023). *Nudging Nutrition: Lessons from the Danish "Fat Tax."* http://arxiv.org/abs/2312.11481

Daniel Bunn, Sean Bray, J. H. (2023). *Insights into the Tax Systems of Scandinavian Countries*. Tax Foundation.

Dynan, K., & Sheiner, L. (2018). GDP as a Measure of Economic Well-being. *Hutchins Center on Fiscal & Monetary Policy At Brookings*, *43*, 1–53. https://www.brookings.edu/wp-content/uploads/2018/08/WP43-8.23.18.pdf

Esteban Ortiz-Ospina, M. R. (2024). *Taxation*. Our World in Data.

Freddy, C. (2023). *Context and Recent Developments*.

Green, S. O. (2019). *Danish Exports Of Green Technology Increased By Billions In 2019*. State Of Green.

Gujarati, D. N., & Porter, D. C. (2009). *Basic Econometrics (5th ed.)*. McGraw-Hill/Irwin.

Gürlek, M. (2020). Innovation Performance. *Tech Development through HRM*, 53–57. https://doi.org/10.1108/978-1-80043-312-02020006

Heathcote, J., Storesletten, K., & Violante, G. L. (2020). How Should Tax Progressivity Respond to Rising Income Inequality? *Journal of the European Economic Association*, *18*(6), 2715–2754. https://doi.org/10.1093/jeea/jvaa050

Hines, J., Kleven, H., Poterba, J., Carlos, J., Serrato, S., Slemrod, J., Troiano, U., Yagan, D., Zidar, O., Zwick, E., Fuqua, D., Ferrario, B., Herman, C., Ho, H., Jimenez, R., Raux, R., & Roussille, N. (2022). Taxation And Innovation In The Twentieth Century. *The Quarterly Journal Of Economics*, 329–385.

Hossain, D. M. I., & Abdullah, D. M. N. (2022). Tax Structure and Its Relationship with Economic Growth – Bangladesh Context. *Business Perspective Review*, *4*(1), 1–15. https://doi.org/10.38157/bpr.v4i1.368

Hybel, U. (2023). *Country Report Denmark* (Vol. 8014, Issue June). https://doi.org/10.1007/978-3-642-57256-2_8

Jansen, A., Wang, R., Behrens, P., & Hoekstra, R. (2024). Beyond GDP: a review and conceptual framework for measuring sustainable and inclusive wellbeing. *The Lancet Planetary Health*, *8*(9), e695–e705. https://doi.org/10.1016/S2542-5196(24)00147-5

Jensen, A. (2022). *Time Series in Tax Performance ∗. May*.

Jones, L. E., Rossi, P. E., & Angeles, L. (2014). Optimal Taxation in Models of Endogenous Growth. *Journal of Political Economy*. https://doi.org/10.1086/261884

Kirikkaleli, D., Abbasi, K. R., & Oyebanji, M. O. (2023). The asymmetric and long-run effect of environmental innovation and CO2 intensity of GDP on consumption-based CO2 emissions in Denmark. *Environmental Science and Pollution Research*, *30*(17), 50110–50124. https://doi.org/10.1007/s11356-023-25811-1

Ko, Y. W. (2020). Tax Design for Inclusive Growth. *Journal of Taxation and Accounting*, *21*(1), 65–87. https://doi.org/10.35850/kjta.21.1.03

Lorenz, J., Paetzel, F., & Schweitzer, F. (2012). *Redistribution spurs growth by using a portfolio effect on risky human capital*.

Mallett, J., & Keen, C. (2012). *Does GDP measure growth in the economy or simply growth in the money supply? August*. http://arxiv.org/abs/1208.0642

Minh Ha, N., Tan Minh, P., & Binh, Q. M. Q. (2022). The determinants of tax revenue: A study of Southeast Asia. *Cogent Economics and Finance*, *10*(1). https://doi.org/10.1080/23322039.2022.2026660

Mishra, B. R., & Nancharaiah, G. (2016). Export or Domestic Demand-Led Growth in BRICS Countries? *The Indian Economic Journal*, *63*(4), 725–749. https://doi.org/10.1177/0019466220160410

Mohammed, M. (2020). Green tax shocks and economic growth. *International Journal of Energy Economics and Policy*, *10*(2), 302–318. https://doi.org/10.32479/ijeep.8660

Mose, N., Hansen, D., Economist, S., & Economist, S. (2024). *Increased Pharmaceutical Exports Have Both Aggregate and Distributional Effects*. *5*.

Okunogbe, O., & Tourek, G. (2024). How Can Lower-Income Countries Collect More Taxes? The Role of Technology, Tax Agents, and Politics. *Journal of Economic Perspectives*, *38*(1), 81–106. https://doi.org/10.1257/jep.38.1.81

Oliveira, L. (2001). *Foreign Direct Investment and Export-Led Growth: A Challenge to Brazil*.

Orhan, A., Emikönel, M., Emikönel, M., & Castanho, R. A. (2022). Reflections of the “Export-Led Growth” or “Growth-Led Exports” Hypothesis on the Turkish Economy in the 1999–2021 Period. *Economies*, *10*(11). https://doi.org/10.3390/economies10110269

Østergaard, C. R., Holm, J. R., & Park, E. (2021). Firms' contribution to the green transition of the Danish national system of innovation - changes in technological specialization, skills, and innovation. *Globalization, New and Emerging Technologies, and Sustainable Development: The Danish Innovation System in Transition*, 231–251. https://doi.org/10.4324/9781003037750-17

Oulton, N. (2018). *GDP and the system of national accounts: past, present and future*. *June*.

Oulton, N. (2019). GDP Is a Measure Of Output and Not Welfare. Or, HOS Meets The SNA. *Economics*, *March*.

Romer, P. M. (1990a). Endogenous Technological Change. *The Journal OfPolitical Economy*, *98*(5).

Romer, P. M. (1990b). Human Capital and Growth: Theory And Evidence. *Carnegie-Rochester Conference Series on Public Policy*, *32*, 251–286.

Sannassee, R. V., Seetanah, B., & Jugessur, J. (2014). Export-Led Growth Hypothesis: A Meta-Analysis. *The Journal of Developing Areas*, *48*(1), 361–385. https://doi.org/10.1353/jda.2014.0018

Savranlar, B., Ertas, S. A., & Aslan, A. (2024). The role of environmental tax on the environmental quality in EU counties: evidence from panel vector autoregression approach. *Environmental Science and Pollution Research*, *31*(24), 35769–35778. https://doi.org/10.1007/s11356-024-33632-z

Sharma, S. (2022). On Exports and Economic Growth: Revisiting Export-Led Growth Hypothesis Including North-South Divide. *SEISENSE Journal of Management*, *5*(1), 31–48. https://doi.org/10.33215/sjom.v5i1.733

Stameski, N., Radulescu, M., Zelenović, V., Mirović, V., Kalaš, B., & Pavlović, N. (2024). Investigating the Effects of Environmental Tax Revenues on Economic Development: The Case of Nordic Countries. *Sustainability (Switzerland)*, *16*(18), 1–17. https://doi.org/10.3390/su16187957

Stoilova, D. G. (2023). The Impact of Tax Structure on Economic Growth: New Empirical Evidence from Central and Eastern Europe. *Journal of Tax Reform*, *9*(2), 181–196. https://doi.org/10.15826/jtr.2023.9.2.136

Surveys, O. E. (2007). OECD Economic Surveys. In *OECD Economic Surveys* (Vol. 2009, Issue 1). https://doi.org/10.1787/9789264064706-uk

Ullah, S., Nobanee, H., Azim, F., & Khiati, M. (2025). Financial Foundations For Sustainability: How Business Sophistication, Tax Policy, And Technology Shape ESG In Belt And Road Initiative Countries. *Global Sustainability*, *8*. https://doi.org/10.1017/sus.2025.4

Wagner, J. (2014). *Exports, R&D and Productivity: A test of the Bustos-model with enterprise data from France, Italy and Spain* (Issue 310).

Zotkaj, K., & Aliu, F. (2024). The concept of sustainable taxation and its impact on tax policy. *EJournal of Tax Research (2024)*, *22*(3), 462–491.

Zucman, G. (2014). Taxing across Borders: Tracking Personal Wealth and Corporate Profits. *Journal of Economic Perspectives*, *28*(4), 121–148. https://doi.org/10.1257/jep.28.4.121