THE EFFECT OF FOREIGN DIRECT INVESTMENTS ON CORPORATE TAX REVENUES: AN EMPIRICAL ANALYSIS FOR OECD COUNTRIES[1]

Kafkas University
Economics and Administrative Sciences Faculty
KAUJEASF
Vol. 14, Issue 27, 2023
ISSN: 1309 – 4289
E – ISSN: 2149-9136

Article Submission Date: 03.11.2022 *Accepted Date: 31.01.2023*

Şeref Can SERİN
Res. Asst.
Harran University
Faculty of Economics and Administrative Sciences,
Şanlıurfa, Türkiye
scserin@harran.edu.tr
ORCID ID: 0000-0001-8575-9128

Murat DEMİR
Prof. Dr.
Harran University
Faculty of Economics and Administrative Sciences,
Şanlıurfa, Türkiye
mdemir@harran.edu.tr
ORCID ID: 0000-0002-1466-1104

ABSTRACT

Foreign direct investment (FDI) increased globally in the 1980s, parallel to the increasing liberalization of financial markets, the reduction of exchange rate controls, increased capital mobilization, and accelerated technological developments. FDIs offer versatile macro and micro scale positive effects to the host economies. In this context, FDIs have been the focus of academicians and policymakers for reasons such as filling the domestic savings gap, providing financial stability, achieving economic growth targets, and increasing social welfare, which is needed for developing and developed countries. Therefore, governments tend to build attractive investment zones for FDIs by providing tax cuts/advantages and bureaucratic conveniences in financial legislation. In this study, using system-GMM estimator, the effect of FDIs on corporate tax revenues for 35 OECD member countries in the 2005-2020 period was examined and it was understood that the said effect was limited but negative.

Keywords: *Foreign direct investments, corporate tax revenue, dynamic panel data analysis*
JEL Codes: *F38, H25, C23*

Scope: *Economics*
Type: *Research*

DOI: 10.36543/kauiibfd.2023.009

Cite this article: Serin, Ş. C. & Demir, M. (2023). The effect of foreign direct investments on corporate tax revenues: An empirical analysis for OECD countries. *KAUJEASF, 14*(27), 223-248.

[1] It has been declared that the relevant study complies with the ethical rules.

DOĞRUDAN YABANCI YATIRIMLARIN KURUMLAR VERGİSİ GELİRLERİ ÜZERİNE ETKİSİ: OECD ÜLKELERİ İÇİN AMPİRİK BİR ARAŞTIRMA

Kafkas Üniversitesi
İktisadi ve İdari Bilimler
Fakültesi
KAÜİİBFD
Cilt, 14, Sayı 27, 2023
ISSN: 1309 – 4289
E – ISSN: 2149-9136

Makale Gönderim Tarihi:03.11.2022 *Yayına Kabul Tarihi: 31.01.2023*

Şeref Can SERİN
Arş. Gör.
Harran Üniversitesi
İktisadi ve İdari Bilimler Fakültesi,
Şanlıurfa, Türkiye
scserin@harran.edu.tr
ORCID ID: 0000-0001-8575-9128

Murat DEMİR
Prof. Dr.
Harran Üniversitesi
İktisadi ve İdari Bilimler Fakültesi,
Şanlıurfa, Türkiye
mdemir@harran.edu.tr
ORCID ID: 0000-0002-1466-1104

ÖZ | Doğrudan yabancı yatırımlar (DYY), 1980'li yıllarla birlikte finansal piyasaların giderek artan oranda liberalleşmesi, döviz kuru kontrollerinin azaltılması, sermayenin mobilizasyonunun artması ve teknolojik gelişmelere paralel olarak küresel ölçekte artış göstermiştir. DYY'ler makro ve mikro ölçekli birçok pozitif etki sunmaktadır. Bu kapsamda gelişmiş ülkelerin yanı sıra özellikle gelişmekte olan ülkeler açısından ihtiyaç duyulan tasarruf açığını kapatma, finansal istikrarı sağlama, ekonomik büyüme hedeflerini gerçekleştirme ve sosyal refahı artıma gibi nedenlerle DYY'ler akademik çevrelerin ve politika yapıcıların ilgi odağı olmuştur. Dolayısıyla hükümetler, DYY'ler için vergi indirimleri/avantajları ve mali mevzuatlarda bürokratik kolaylıklar sağlayarak cazip birer yatırım alanı oluşturma eğilimi sergilemektedirler. Bu yönüyle DYY'lerin, vergi gelirleri üzerindeki etkisi ve boyutu önemli bir soru haline gelmektedir. Bu çalışma kapsamında sistem-GMM tahmincisi kullanılarak 2005-2020 döneminde 35 OECD üyesi ülkede DYY'lerin kurumlar vergisi üzerindeki etkisi incelenmiş, sonuçta söz konusu ilişkinin sınırlı düzeyde ancak negatif yönde olduğu anlaşılmıştır.

Anahtar Kelimeler: *Doğrudan yabancı yatırımlar, kurumlar vergisi gelirleri, dinamik panel veri analizi*
JEL Kodları*: F38, H25, C23*

Alan: *İktisat*
Türü: *Araştırma*

1. INTRODUCTION

The term foreign direct investment (hereafter FDI) is used to describe the long-run participation of the foreign investor in a business outside the country's borders where it is accepted as legally resident, at a level that it can have control in the management (OECD, 2008). Multinational companies carry out FDIs. On the other hand, multinational companies are considered residents in terms of the location of their production centers. Another ambiguous statement, "having control or vote," is explained as foreign investors obtaining at least 10% of the total capital of the enterprise in which they invest. However, having 10% of the capital share may only sometimes be sufficient to have the right to control. On the other hand, obtaining less than 10% of the capital share can provide control under specific conditions. For this reason, it is possible to mention the views advocating that FDIs should be seen as a combination of some potentiality and powers, such as the representation rate of the investor in the board of directors, the level of participation in policy-making processes, access to technical information and the ability to change managerial personnel (Chadhuri & Mukhopadhyay, 2014, p. 2).

FDIs are an important input type with positive multifaceted effects for countries at different levels of economic development (Goodspeed, Martinez-Vazquez, & Zhang, 2011, p. 171). To illustrate, FDIs are noteworthy in achieving sustainable economic development, a more inclusive goal for developed countries. On the other hand, FDI in developing countries assists primary objectives such as increasing the physical investments required for economic growth, establishing financial stability, creating additional employment, and even improving integration with international markets (Saini & Singhania, 2018, p. 348). Therefore, it is possible to utter competitive practices between developed and developing countries in the process of increasing FDIs.

From a theoretical perspective, FDIs come to the forefront with their capital accumulation-increasing dimension within the scope of Solow-type neo-classical economic growth models. However, FDIs can also offer positive effects within the scope of endogenous economic growth models in terms of information flow and technological development, with the know-how opportunity it offers rather than a mere capital accumulation (Akadiri, Güngör, Akadiri, & Bamidele-Sadiq, 2019; Philip, Sertoğlu, Akadiri, & Olasehinde-Williams, 2021). However, theoretical expectations and empirical findings contradict each other on this point. However, a significant number of empirical studies support the idea that FDIs positively stimulate economic growth in line with theoretical expectations (Pegkas, 2015, p. 131; Yimer, 2022, p. 1); on the other hand, some studies that

cannot be ignored reported that this relationship is negative (Bende-Nabende, Ford, Santoso, & Sen, 2003; Adams, 2009).

It is also possible to mention numerous studies examining the effects of FDIs on different macroeconomic indicators. For instance, FDIs offer substitution opportunities in accessing the capital needed in host countries when borrowing from international markets and commercial banks are challenging (Aitken & Harrison 1999, pp. 604-605; Chadhuri & Mukhopadhyay, 2014, p. 2). In addition, FDIs serve to establish long-term economic relations with investor's countries and thus to improve foreign trade volume (UNCTAD, 2012, p. 6). At the same time, as mentioned above, FDIs offer versatile know-how opportunities such as knowledge, production method, and management skills (OECD, 2008, p. 89). So that it is possible to suggest that FDI plays a role in improving both the quality and quantity of capital accumulation in the host country (Seid, 2002, p. 32; Sabir & Kahn, 2018, p. 245). Furthermore, FDIs can also limit crowding-out effects due to capital constraints, especially for developing countries with low domestic savings (Sornarajah, 2010, p. 108). Lastly, FDIs directly or indirectly increase employment, factor efficiency, and productivity (Alam, Arshad, & Rajput, 2013, p. 134; Gasparėnienė, Kliestik, Šivickienė, Remeikienė, & Endrijaitis, 2022, p. 44).

In order to increase FDIs, the potential effects of which are increasingly understood today, governments tend to use tax incentives, bureaucratic conveniences, and de-regulation practices more and more intensively (Bozatlı, 2021, p. 95). In fact, governments prefer harmful competition types, also called race-to-the-bottom, which includes lowering tax rates in order to increase FDI inflows (Yurdadoğ & Albayrak, 2017). The race to the bottom hypothesis, also expressed as an output of the globalization process, shows that privileges created to improve FDI inflows in many areas, such as reducing standards in labor employment, flexing environmental regulations, and reducing tax rates (Olney, 2013, p. 191). Therefore, the question of how FDIs effect the host countries with their potential effects and risks makes it a matter of curiosity and examination.

Determining the total size of FDIs might be the first stage that can be taken in order to be informed about the effects of their positive and negative aspects. According to the data of WDI (2022), the global FDI flows amount was $12.3 billion in 1970. This level soared approximately four times in 10 years and reached $53.41 billion in 1980. In 1980 and after, the period when the globalization process gained momentum, FDIs showed an increasing trend and reached the level of $1.57 trillion by 2000. However, this increase left its place in a volatile structure in the 2005-2020 period. Moreover, UNCTAD (2022) states that the pandemic and the Russian-Ukrainian war will negatively alter FDIs. The

Figure 1 below shows that OECD member countries host a significant portion of the total FDIs.

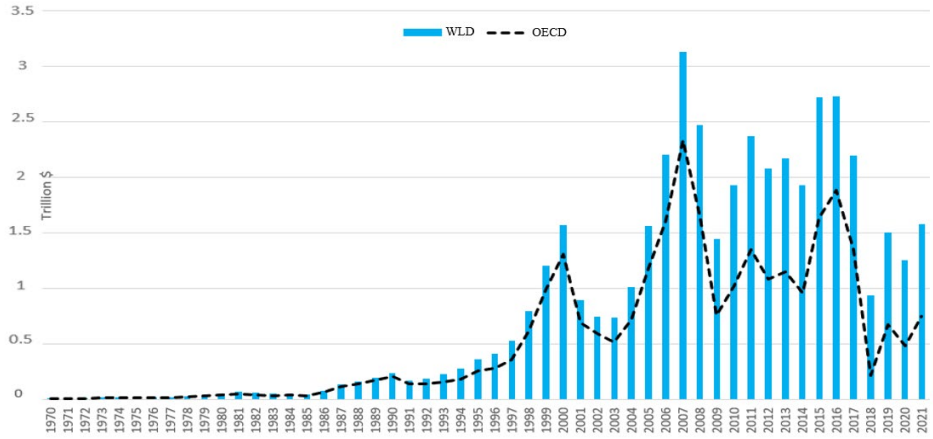

Figure 1: Net Foreign Direct Investment (trillion $)

Source: (WDI, 2022; UNCTAD, 2022)

FDIs are capital component directly involved in the physical production process, unlike portfolio investments that cover stocks and debt securities purchases made with interest income and speculation motive. Therefore, the net foreign capital inflow is the expected positive effect of portfolio investments. Nevertheless, portfolio investments' high mobility in the short run may increase financial fragilities. In contrast to portfolio investments, FDIs are long-run physical investments and hence do not have the high mobility such portfolio investments have. Therefore, it is not reasonable to consider that FDIs cause financial fragility in the short run.

FDIs are examined under two headings as green field and brownfield investments. In the simplest terms, green-field FDIs involve the creation of a new production facility in the host country. As a result, green-field FDIs offer multidimensional positive effects to the host country, such as foreign capital inflows, new employment opportunities, production techniques, and management skills (Pratomo, 2020). On the other hand, brownfield FDIs include merging with companies in host countries or acquiring the ownership of companies (Bayar & Öztürk, 2018). Therefore, unlike portfolio investments, both types of FDI are carried out to operate directly in the host country, bearing sunk costs and generating long-term profits. Consequently, the economic and institutional risks of the country where the investment is made become a determinant for the investor (Matima & Gossel, 2022).

The potential impacts of FDIs are a crucial matter for the host country. A significant part of the literature investigating the effects of FDIs on the host country focuses on the effects of government policies. In this context, the effect of the tax system and tax rates on FDI has been the focus of intense curiosity in academic investigations. The main finding of these studies is that there is a negative relationship between tax rates and FDIs as a factor that is reducing profitability. On the contrary, studies on the effect of FDIs on tax revenues remained relatively limited. In addition, the empirical findings presented in the literature examining the effect of foreign direct investments on tax revenues also point to different findings. First of all, studies examining the causality between FDI, and tax revenues point to the finding of unidirectional causality from FDI to tax revenues (Odabaş, 2016; Bayar & Öztürk, 2018; Bahtiyar, Karabacak, & Meçik, 2018; Sağdıç, Yıldız, & Sayın, 2020; Albayrak & Bozatlı, 2021). Investigations that take this causality to another methodology show that the effect of FDI on tax revenues is positive (Gropp & Kostial, 2000; Mahmood & Chaudhary, 2013; Okey, 2013; Balıkçıoğlu, Dalgıç, & Fazlıoğlu, 2016; Pratomo, 2020; Camara, 2022). However, some studies are reporting that the impact of FDIs on tax revenues is negative (Sarısoy & Koç, 2010; Jeza, Hassen, & Ramakrishna, 2016; Bayar & Öztürk, 2018; Kutbay, 2019; Gasparėnienė et al., 2022). Therefore, the effect of FDI on tax revenues is unclear in the empirical literature. In this context, it is thought that this study will contribute to the literature to some extent.

Within the scope of this research, our main aim is to estimate the impact of FDI inflows on corporate tax revenue in the period 2005-2020 for 35 OECD[2] member countries using dynamic panel data analysis techniques. The rest of the study is designed as follows: In the second part, some basic theoretical expectation of the FDIs is detailed. The following section presents related empirical literature examining the relationship between FDI and tax revenues. The fourth chapter presents the data, methodology, model, and empirical analysis results. Finally, in the last part, the findings and empirical literature are discussed comparatively, and the study is completed by giving policy recommendations suitable for the current conditions.

[2] For the complete list of the sample see appendix.

2. DETERMINANTS AND EFFECTS OF FOREIGN DIRECT INVESTMENT

FDIs are divided into two sub-sections according to their composition. The first one is greenfield FDIs, which refer to investments made to build a new facility in the host country. The second type is brownfield FDIs, which contains acquisitions of an existing company, cross-border mergers, and acquisitions (Takayama, 2021, p. 2). Both types of FDIs are considered as an input that can positively effect economic growth by increasing the level of capital accumulation and total investment within the scope of neo-classical growth models. Besides that, greenfield FDIs are especially important in economic growth for countries at different levels of development, since they provide technological improvement, information flow, and R&D (Yeldan, 2011, p. 221) included in the endogenous growth model.

Due to the potential positive effects, policymakers try to set up encouraging environments for FDIs by reviewing and changing fiscal legislation, regulations, and tax systems (Talpoş & Ludoşean, 2012, p. 16). Even though it is a secondary objective, in return for the advantages offered to the FDIs, tax revenue is obtained by governments. Moreover, for the reason that FDIs cause taxable events in different areas: the new employment areas they create, the added values they generate, and the goods and services they trade. Therefore, theoretically, it would not be absurd to expect FDIs to effect total tax revenues positively. However, at this point, the empirical literature offers contradictory findings.

Undoubtedly, tax rates in the host country are among the major determinants of FDI flows. However, besides tax rates, many other factors effect the region where FDIs will be made: The existence of competitive market conditions, intensity, and effectiveness of regulations, long-term profitability, the rule of law, the existence of developed financial markets, and access to the qualified and sufficient workforce. Furthermore, it is possible to refer to macroeconomic factors such as sufficient infrastructure conditions and financial and fiscal stability (Seid, 2002, p. 22; Talpoş & Ludoşean, 2012, p. 16). In addition, in some investigations explaining, the microeconomic determinants of FDIs: size of markets (Shatz & Venables, 2000, p. 125), transportation costs (Brainard, 1997, p. 520), labor cost (Feenstra & Hanson, 1997, p. 371); human capital, specialization and high productivity (Artige & Nicollini, 2010, p. 147), and commercial limitations (Mistura & Roulet, 2019, p. 6).

It is also necessary to remark on the FDI restrictiveness index shared by the OECD, which covers macro and micro effects. The FDI restrictiveness index contemplates foreign capital restrictions, screening and pre-approval

requirements for investment, rules for personnel, and other restrictions on activities of foreign businesses, respectively (Kalinova, Palerm, & Thomsen, 2010, p. 9). The index takes values between 1 and 0, demonstrating that FDI restrictiveness increases as the value of the index convergence to 1. Below in Figure 2, the FDI restrictiveness index for 35 selected OECD member countries is presented as a scatterplot graph.

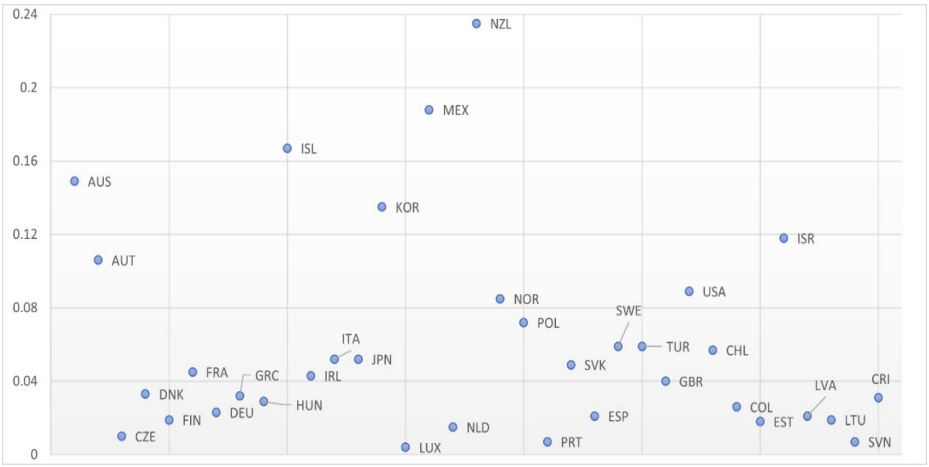

Figure 2: FDI restrictiveness index

Source: (OECD, 2022)

Considering the restrictiveness index, which is considered a key element of FDIs, it is understood that OECD countries have a high degree of liberalization. For this reason, it is a consistent finding that the OECD sample, which consists of mainly developed countries, constitutes a substantial portion of FDIs worldwide.

Depending on the factors mentioned above, FDIs create positive effects on tax revenues directly or indirectly due to reasons such as productivity growth, technology transfer, creation of new employments, rise in total production, increase in consumption level, and additional foreign financial resource inflows to the domestic market (Camara, 2022). Furthermore, FDIs can expand the income tax base by creating new employment opportunities. Additionally, FDIs are, by definition, an investment that can directly expand the corporate tax base. Finally, FDIs can have a positive impact on the purchase and sale of goods and services, as well as expenditure taxes. However, some mechanisms, such as reduced tax tariffs, customs duty exemptions, and tax cut applications for FDIs, can negatively affect tax revenues.

Briefly, it is a research field where a consensus has not yet been reached on whether the advantages or disadvantages of FDIs dominate the host country. Within the scope of this research, the relationship between FDIs and corporate tax revenues, which is handled by a very limited study in the literature, is empirically investigated. The following section summarizes empirical research on the impact of FDI on tax revenues.

3. LITERATURE REVIEW

Investigation within the framework of FDIs and taxes focus heavily on the effects of taxes on FDIs movements. It is possible to interpret this phenomenon in the literature as a motivation to test the effectiveness of preferred tax policies to be successful in increasing FDIs. The main finding of these studies is that there is a negative relationship between tax rates and FDI inflows. In other words, tax revenues obtained from FDI have a negative impact on FDIs (Devereux & Freeman, 1995; Mohamed & Sidiropoulos, 2010; Hunady & Orviska, 2014; Kaya & Ezanoğlu, 2020). However, a relatively limited number of studies in the empirical literature deal with the effect of FDIs on tax revenues. This gap in the literature stems from the assumption or thought that the causal relationship is from tax policy to FDIs. However, in the recent literature, the number of studies identifying a causal relationship from FDIs to tax revenues is substantial. Nevertheless, there is no consensus in studies examining the effect of FDIs on tax revenues yet. Therefore, studies on the effect of FDI on tax revenues try to fill this gap in the literature. Findings from these studies are results based on positive analysis and are important in providing policymakers with the necessary scientific foundations. Within the scope of this section, an attempt is made to present a summary of the literature on empirical studies examining the effect of FDI on tax revenues. It is possible to divide the literature into two: studies that examine the effect of FDIs within the scope of total tax revenues and those that examine corporate tax revenues. With the deductive method, the studies on total tax revenues and the investigations made specifically for corporate tax will be mentioned.

Using time series techniques, Mahmood and Chaudhary (2013) examined the effect of FDIs on tax revenues in Pakistan for the period 1972-2010. As a result of the study, it has been argued that FDIs positively effect total tax revenues in Pakistan. Okey (2013) investigated the effect of FDIs on tax revenues with panel data analysis techniques for 8 West African Economic and Monetary Union (WAEMU) member countries for the period 1989-2009. The results indicate that FDIs have a positive impact on tax revenues. The author also proclaims that high institutional quality exacerbates the positive effect of FDIs on total tax revenue.

Aslam (2015) investigated the relationship between FDI and tax revenues with time series techniques for 1990-2013 in Sri Lanka. The author reported that FDIs have a positive effect on total tax revenues.

Working with a novel data set, Balıkçıoğlu et al., (2016) examined the effect of FDIs made to manufacturing companies operating at different levels of technological development in Türkiye on tax revenues for the period 2004-2012 using panel data analysis techniques. As a result of the study, it has been reported that the effect of FDI inflows on tax revenue is positive. Additionally, the authors stated that technology level positively correlated with FDI on taxation. On the other hand, Odabaş (2016) investigated the relationship between FDI and tax revenues using panel causality analysis techniques for the seven transition economies of the EU for the period 1996-2012. The author reported that there is a unidirectional causality from FDI to tax revenues.

Furthermore, Bayar and Öztürk (2018) scrutinized the relationship between FDIs and tax revenues with panel data analysis techniques for the period of 1995-2014 for 33 OECD member countries. The authors could not obtain a statistically significant relationship at the panel level; However, they stated that FDIs negatively impacted Austria, France, Italy, and Poland. In addition, parallel to the former analysis, the unidirectional Granger causality from FDI to tax revenues is another finding presented within the scope of the study. Also, Basheer, Ahmad, & Hassan (2019) investigated the effect of macroeconomic and financial factors on tax revenues with panel data analysis techniques for the period 1990-2010 in Bahrain and Oman. The authors concluded that the coefficient showing the effect of FDIs on tax revenues is not different from zero but has a positive sign. Bayar and Çelik (2019) examined the effects of FDIs and trade liberalization on tax revenues in Türkiye with time series techniques in the 1974-2017 period. The authors stated that FDIs have a positive effect on tax revenues. Within the scope of the study, it has been revealed that trade liberalization, another indicator of the globalization phenomenon, has a positive effect on tax revenues.

Kutbay (2019) examined 1995-2017 in BRIC+T and G7 countries with panel data techniques to determine the factors effecting tax revenues. As a result of the study, the author argued that a 1% increase in FDIs increased tax revenues by 0.04% in G7 but decreased by 0.03% in BRIC-T countries. The result clearly shows that the net effect of FDIs on tax revenue primarily originates from the countries included in the sample. On the other hand, Sağdıç et al. (2020) tested the effect of FDIs on tax revenues and economic growth process with panel causality analysis techniques for the Fragile Five countries during the 1980-2018

period. In this context, it has been reported that FDIs have a unidirectional Granger causality to tax revenues and to the economic growth.

In a recent study, Camara (2022) investigated the effect of FDIs on total tax revenues for 90 developing countries from 1996 to 2017 using a dynamic panel data analysis technique. The author reported that FDIs have a positive effect on total tax revenues. However, this relationship was found to be statistically insignificant for income taxes. In addition to these findings, the authors also mentioned that FDIs boost financial development. Furthermore, the authors also stated that FDIs improve financial development, institutional quality, and human capital in developing countries and thus facilitate the collection of tax revenues. Finally, Gasparėnienė et al. (2022) examined the effect of FDI stock and outward FDIs on tax revenues for the EU member states for the period 1999-2019. As a result of the study, FDIs affect tax revenues negatively but to a limited degree; on the contrary, outward FDI effect tax revenue positively but again extremely limited degree. The authors point out that the negative impact of FDIs might be explained by profit shifting mechanism.

As stated earlier, limited studies examined the impact of FDIs on corporate tax. Gropp and Kostial (2000) examined the relationship between foreign direct investments, tax revenues, and corporate tax revenues using panel data analysis techniques for 19 OECD member countries from 1988-1997. As a result of the study, the authors found that FDI inflows were positive on corporate tax revenues at the panel level; however, they reported negative effects on corporate tax revenues for Germany and Italy on a cross-section basis. For a larger sample, Sarısoy and Koç (2010) investigated the effect of FDI inflows on corporate tax revenues with panel data analysis techniques for 21 OECD member countries over the 1981-2008 period. The study concluded that the effect of FDIs on corporate tax differs according to country, but it negatively affects corporate tax revenues in Türkiye. Using time series techniques, Jeza et al. (2016) investigated the relationship of FDIs with tax revenue types in Ethiopia for the period 1974-2014. The study's findings revealed that FDIs negatively affect corporate tax revenues because of the facility of tax holidays and transfer pricing mechanisms. Secondly, although it has an increasing effect on employment, FDI has a negative effect on income taxes. The authors explain the negative impact of FDIs on tax revenue through the extensive provision of tax incentives.

Bahtiyar et al. (2018) examined the relationship between FDIs and tax revenues and corporate tax for 12 EU member states and Türkiye, within the scope of 1989-2016, using the panel causality analysis method. The authors reported that there is a unidirectional causality from FDI to total tax revenues in Ireland and Spain and from FDI to corporate tax in Germany and Portugal.

However, the causality could not be determined for other countries. Furthermore, Pratomo (2020) examined the effect of FDIs on tax revenues for 80 developing countries from 2000 to 2016 using panel data analysis techniques. As a result of the study, it was stated that FDIs have a positive effect on tax revenues. However, the author also found that greenfield FDIs have a negative and statistically significant impact on corporate tax revenues in high-income countries but not developing the total sample. Finally, Albayrak and Bozatlı (2021) examined the relationship of FDIs with corporate tax in the context of the 1971-2018 period in 20 selected OECD member countries using panel causality analysis techniques. The authors determined that there is unidirectional causality from FDIs to corporate tax in Germany and the USA and unidirectional causality from corporate tax to FDIs in Finland and Australia. A detailed summary table of the literature on empirical studies examining the effect of FDIs on tax revenues is presented in the appendix.

As can be seen in the empirical studies presented above, they support the positive impact of FDIs on total tax revenues. However, it is negative when the relationship above is considered in the corporate tax context. The reasoning for the negative effect of FDIs explained by tax holidays, tax cuts, tax-free zones, transfer pricing. In this respect, our study is trying to fill the gap in the literature, both by using dynamic panel data analysis techniques and by including important international integration indicators such as trade openness and financial development.

4. RESEARCH METHODOLOGY

In many economic relations that are the subject of empirical analysis, the variables are not determined externally but simultaneously with the dependent variable. Moreover, in most economic relationships, the dependent variable is affected by past values. The fundamental feature of dynamic panel data analysis techniques is that it allows for examining the dynamic processes inherent in economic relations. Within the scope of the study, the effect of FDI inflows on corporate tax revenues is investigated using the system-GMM method, which is one of the dynamic panel data analysis techniques, using data compiled from the World Bank and OECD databases for 35 OECD member countries in the 2005-2020 period.

4.1. Data and Model

The model examined in the study is presented in equation 1:

$$CTR_{i,t} = \lambda CTR_{i,t-1} + \beta FDI_{i,t} + \theta\, X_{i,t} + \alpha_i + \gamma_t + \mu_{i,t} \qquad (1)$$

In Equation (1), corporate tax revenues (%GDP) preferred as a dependent variable are represented by notation CTR. In addition, since the autoregressive

dynamic panel data process is applied, only the lagged value of the dependent variable CTR is preferred as the independent variable in equation 1. The independent variable, FDI inflows (%GDP), is shown with FDI notation. In addition, X represents economic growth, GDP shares of added values of manufacturing, services, and industry sectors and their notations in the models are GDPR, MNU, SRV, and IND, respectively. Moreover, the X notation also symbolizes the level of financial development and trade openness, which are thought to effect corporate taxpayers' activities and FDI inflows, are represented in the models by FD and TRD, respectively. Indices in equation 1 represent i country and t time unit. Lastly, unit-specific effects represent α_i, time-specific effects are expressed with γ_t symbols, and $\mu_{i,}$ symbols represent the error term. Within the scope of the model presented in Equation 1, 8 different combinations were estimated.

Table 1: Explanations of Variables Used in Dynamic Panel Data Analysis

Variable	Definition	Unit	Source
CTR	Corporate Tax Revenues	%GDP	OECD
FDI	Foreign Direct Investment Inflows	%GDP	OECD
GDPGR	Growth Rate of Gross Domestic Product	%Ratio	WDI
MNU	Added Value of the Manufacturing Sector	%GDP	WDI
SRV	Added Value of the Service Sector	%GDP	WDI
IND	Added Value of the Industry Sector	%GDP	WDI
TRD	Trade Openness	%GDP	WDI
FD	Financial Development Index	Index	IMF

All data used within the model's scope were derived from OECD and WDI databases, as presented in Table 1. In addition, table 2 below has been created to show descriptive statistics about the data used in the analysis.

Table 2: Dynamic Panel Data Analysis: Descriptive Statistics

Variable	Obs.	Mean	St. Dev.	Min.	Max.
CTR	560	2.963	1.516	0.157	12.588
FDI	560	3.785	10.200	-54.791	139.103
GDPGR	560	1.945	3.711	-14.838	25.176
MNU	560	14.371	5.161	4.554	34.903
SRV	560	62.783	6.463	48.158	80.136
IND	560	24.651	5.711	10.426	40.294
TRD	560	95.201	57.952	23.442	380.104
FD	560	0.599	0.206	0.192	0.967

Source: Calculated by the authors with the Stata 14.2 package program

First of all, it is seen that the maximum number of observations per variable within the scope of the 2005-2020 period of 35 countries is 560, and a balanced panel data set was created. It has been determined that the corporate tax revenues (%GDP), preferred as the dependent variable, is 2.9% on average, and the standard deviation is 1.5 for the sample and period. The meager share of corporate tax revenues across the OECD is a factor that may cause the impact of FDIs to be limited. On the other hand, the average value of FDI inflows (%GDP) is 3.7%, but its standard deviation is as high as 10.2, which supports the idea that FDI inflows have a much more volatile structure between countries. In addition, the average value added (% GDP) in the selected countries is 14.3% for the manufacturing sector, 62.7% for the service sector, and 24.6% for the manufacturing sector. Moreover, trade openness, the sum of export and import (%GDP), is 95% average. Lastly, the financial development index, which takes values between 0-1 and depicts that financial development increases as it approaches 1, was found as 0.59 average.

4.2. System-Generalized Moments Method

In both autoregressive dynamic panels and distributed lag dynamic panel data estimators, the lagged value of the dependent variable is included as an independent variable in the models. This situation causes a correlation between independent variables and the error term, called the endogeneity problem (Gujarati & Porter, 2008, p. 657). The endogeneity problem causes the tests to be made through the least squares estimator to be biased and inconsistent. On the other hand, to overcome the endogeneity, adjusting the time dimension for micro and macro panel data sets (Baltagi, 2021, p. 187). However, time dimension constraints on secondary data often do not allow for such adjustment. Considering the bias created by the endogeneity problem, Arellano and Bond (1991) developed the Generalized Method of Moments (GMM), an estimator that can overcome this problem. Later, Blundell and Bond (1998) developed the GMM model and created two different GMM estimators, system-GMM and difference-GMM. Then Roodman (2009a) demonstrated the working principles of the models by performing proofs and tests on the two models in question.

The estimation process begins with the transformation of the first difference model through the instrumental variable (IV) matrix and estimation with the Generalized Least Squares (G-OLS) method within the scope of GMM models (Baltagi, 2021, p. 190). Owing to the estimation process, GMM estimators are also referred to as two-stage instrumental variable (IV) estimators in the literature. The two-stage structure of GMM models provides the opportunity to produce consistent results in a heteroskedasticity problem beyond overcoming the endogeneity problem. In addition, GMM models can also be used

for sets where the number of cross sections [N>T], which is also expressed as a micro panel data set, is greater than the time dimension. Therefore, unlike other panel data models, it is known that the results produced by the GMM estimator are asymptotically consistent (Yerdelen Tatoğlu, 2020, p. 131). However, the Monte Carlo simulations in this context revealed that the standard error terms of the estimations made by the system-GMM method were biased downwards. For this reason, Windmeijer (2005) developed the robust errors estimator to include it in the system-GMM model and ensure that the standard error terms are not biased downwards.

Sargan (1958) and Blundell and Bond (1998) tests are used to test the validity of over-identification constraints for diagnostic tests used to test the validity of the estimates. In addition, it is stated in the literature that robust Hansen J. (1982) statistics can be used at every stage. In the system-GMM estimation process, the number of (IV) is crucial. Because the increase in the number of (IV) reduces the power of (IV) by making it necessary to test a large number of over-identification constraints, therefore, it is necessary to pay attention to whether the number (IV) is equal to or less than total observation, as Baltagi (2021, p. 188) states.

Finally, dynamic panel data analysis methods frequently encounter the first-order autocorrelation (AR) relationship. This is because the lagged value of the dependent variable is also included as the independent variable in the equation. Therefore, according to the test developed by Arellano and Bond (1991), there should be no second-order autocorrelation relationship to obtain consistent results in GMM estimators (Yerdelen Tatoğlu, 2020, p. 151). In Table 3, the estimation results of 9 different variations of the model included in equation 1, performed by the system-GMM method, are reported.

In order for the system-GMM estimator to produce consistent results, the requirement that the number of (IV) be less than or equal to the total observation is met for all models. In addition, since the AR (2) probability value presented in Table 3 is greater than 0.05, it is understood that none of the models have a second-order autocorrelation relationship. In addition, since the Sargan (1958) test did not give robust results, the Hansen-J (1982) test, which gave robust results, was preferred. The fact that the Hansen-J statistical value in Table 3 is greater than 0.05 indicates that over-identification restrictions are valid. Roodman (2009b: p. 142) states that the Hansen-J test value should take values between 0.10 and 0.25 because as the statistical value convergences to 1, the model loses its asymptotic properties. Lastly, in models that meet the classical linear regression assumptions, there is no need to do a preliminary test for the

system-GMM estimator (Baltagi, 2021). As seen in Table 3, the predicted dynamic models can meet all the requirements of diagnostic tests.

Table 3: System-GMM's Results

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
L.CTR	1.059***	1.051***	0.976***	1.035***	1.079***	1.053***	0.882***	0.462***
	(29.32)	(32.15)	(17.26)	(11.71)	(23.60)	(28.42)	(10.93)	(2.88)
FDI	-0.005*	-0.008***	-0.09***	-0.008***	-0.010***	-0.011***	-0.007***	-0.006*
	(-1.82)	(-6.93)	(-8.17)	(-3.08)	(-5.29)	(-3.97)	(-2.99)	(-2.04)
GDPGR		0.074**	0.097***	0.093***	0.082***	0.682**	0.075***	0.066***
		(2.54)	(2.75)	(2.87)	(2.79)	(2.38)	(2.83)	(4.12)
MNU			-0.076					-0.143
			(-1.01)					(-1.07)
IND				0.019				0.355**
				(0.38)				(2.43)
SRV					0.046			0.210
					(1.16)			(1.04)
TRD						0.003		0.003
						(1.24)		(0.71)
FD							4.974**	0.065
							(2.57)	(0.13)
Unit Obs.	35	35	35	35	35	35	35	35
	525	525	525	525	525	525	525	525
IV	33	33	29	29	31	33	33	29
Ar(2)	z=-0.32	z=0.11	z=-0.06	z=0.02	z=0.05	Z=0.06	Z=0.36	Z=-1.19
	[0.748]	[0.911]	[0.952]	[0.982]	[0.956]	[0.954]	[0.722]	[0.235]
Hansen J.	chi2=33.81	chi2=33.50	Chi2=28.76	Chi2=31.92	Chi2=31.16	Chi2=32.41	Chi2=31.22	Chi2=23.44
	[0.289]	[0.258]	[0.234]	[0.129]	[0.223]	[0.258]	[0.307]	[0.268]

Source: Calculated by the authors with the Stata 14.2 package program

Note: ***, ** and * represent 1%, 5% and 10% significance level, respectively. Values presented in parentheses are *t* statistics.

The result of the empirical analysis presented in table 3 is consistent with theoretical expectations. First of all, the dependent variable's lagged value has a statistically significant and positive sign in all models. Second, FDI inflows, the primary search source within the analysis, have a statistically significant, limited,

but negative effect on corporate tax revenues in all models. The findings are consistent with the studies that empirically examine the effect of FDI on corporate tax (Groop & Kostial, 2000; Sarısoy & Koç, 2010; Jeza et al., 2016; Pratamo, 2020). In addition, the economic growth rate (GDPGR) in all models has a positive and statistically significant effect on corporate tax revenues. However, trade openness, manufacturing, industries, and service sector indicators within the scope of Model 3-6 were not found to be statistically significant. It is possible to interpret only statistically significant coefficients within the scope of the system-GMM model (Baltagi, 2021). The financial development index within Model 7 found statistically significant positive effects on corporate tax revenues.

It is observed that the coefficient signs are stable in the results obtained from model 8, which include all variables and are general models. Similar results were obtained in the final Model 8, and the coefficient for the manufacturing sector was found to be negative and statistically significant (Gasparėnienė et al., 2022). The manufacturing sector (%GDP), which was previously modeled as singular, was negative. It is expected to have a negative impact on corporate tax due to low value-added output and low levels of technology in the sector (OECD, 2008, p. 234), just like in the agricultural sectors (Pratomo, 2020). The coefficient for the industrial sector was found to be positive and statistically significant. However, the coefficients related to the FD and TRD indices in models 8, positive but statistically insignificant. In summary, it has been understood that the effect of FDI inflows on corporate tax revenues in 35 selected OECD member countries within the scope of the 2005-2020 period is quite limited but negative.

5. CONCLUSION AND DISCUSSION

FDIs is used to describe the long-term profit expectation participation of the foreign investor in a business outside the borders of the country where it is legally resident, at a level that it can have control in the management (OECD, 2008). For this reason, FDIs are accepted as an international investment type that comes to the forefront in parallel with globalization activity and exhibits an expansion trend (OECD, 2008). However, according to the latest data, FDIs have declined significantly in the last two years due to the negative effects of the Covid-19 pandemic and the Russian-Ukrainian war (UNCTAD, 2022).

When FDIs examined theoretically, they can offer multiple positive effects: Information and technology transfer, new production methods, factor productivity, and new employment are among the main positive effects of FDIs (Akadiri et al., 2019). On the other hand, there are several other positive factors in terms of FDI inflows to establish and strengthen commercial relations between the investor's country of residence and the host country (Seid, 2002), to ensure

financial stability and to reduce the crowding-out effect due to the low level of domestic savings (Sornarajah, 2010, p. 108). However, according to empirical studies on the effect of FDIs on economic growth, it is not only possible to talk about the positive effect of FDIs (Yimer, 2022). Nevertheless, governments seeking solutions to problems such as economic development and growth, macroeconomic stability, and unemployment also attach importance to FDIs (Talpoş & Ludoşean, 2012). In order to increase FDI inflows, applications such as de-regulation processes, tax advantages and incentives, and bureaucratic conveniences are increasingly preferred by governments (Bozatlı, 2021). In this context, the effects of various factors such as tax rates, tax revenues, degree of regulation, the openness of the host country to foreign trade, and level of financial development on FDI inflows are extensively studied in the literature.

FDI inflows can expand the tax base by creating new production areas, increasing employment indirectly or directly, and causing taxable events in many areas, such as the purchase/sale of goods and services. However, race-to-the-bottom policies of governments to increase FDI inflows or prevent them from turning to other countries have the potential to have a negative impact on tax revenues by narrowing the tax base. The effect of tax revenues has been the subject of many studies within the scope of the factors affecting FDIs movements. However, a limited number of studies have addressed the effect of FDIs on tax revenues. Within the scope of this study, the effect of FDI inflows on tax revenues for the period of 2005-2020 for 35 OECD member countries was estimated with the system-GMM analysis technique, which is one of the dynamic panel data analysis methods. As a result of the study, it has been understood that FDI inflows have a negative but quite limited effect on corporate tax revenues in these countries. Apart from this, it was concluded that all variables except the manufacturing sector presented in equation 1 have statistically significant positive effects on corporate tax revenues. The findings obtained as a result of the empirical analysis are in parallel with Groop & Kostial (2000), Sarısoy & Koç, (2010), Jeza et al., (2016) and Pratomo, (2020) that prefers the same dependent variable. In addition, studies that utilizes time series or heterogeneous panel data analysis techniques on total tax revenues point to the negative effects of FDIs (Bayar & Öztürk, 2018; Gasparėnienė et al., 2022).

However, other studies in the empirical literature argue that FDI inflows have a positive effect on total tax revenues (Mahmood & Chaudhary, 2013; Okey, 2013; Balıkçıoğlu et al., 2016; Camara, 2022). At this point, the main point of divergence in the empirical findings comes from the examined type of taxes. Within the scope of this study, a specific examination of corporate tax is

included, not the total tax revenues. Therefore, it is an expected result for us to differentiate the findings from studies examining total tax revenues.

In our study, the sample's average corporate tax revenue payment (%GDP) is as low as 2.9. Although most of them are developed countries, the corporate tax generates such limited revenue for the sample might be closely related to the tax advantages and cuts offered to corporations, profit shifting, and free-tax zones, supporting the findings. Furthermore, corporate tax rates for 2020 for selected countries presented in the appendix are also an important sign in this context. In selected countries, the average corporate tax rate in 2005-2020 is 24%, while the lowest rate is 9% and the highest rate is 44.4%. In this context, despite the relatively high corporate tax rates, the share of corporate tax (%GDP) in income remains low due to various tax incentives, advantages, and conveniences. Hence, it is observed that not only FDIs, but also local corporations have a limited effect on corporate tax revenues.

Although generating tax revenue from FDIs are considered a secondary purpose, some practices need to be implemented to neutralize this effect. The main ones are to prevent profit-making companies from eroding their tax bases by merging with loss-making companies. On the other hand, in order to prevent the operation of the transfer pricing method, it is necessary to define the related party and arm's length principles in a country-specific manner. Implementing developmental government expenditure policies is a rational option to persuade FDIs to enter the country with tax advantages and factors such as market size, transaction volume, access to skilled labor, and profitability potential.

As our empirical findings and previous studies show, FDIs create an undesirable negative effect in terms of the income level of public finance, apart from the positive effects it provides. In this sense, the negative effect of FDIs on corporate tax revenues indicates a type of tax competition for the sample. In addition, the legal facilitations offered for FDIs pose a risk that should be followed carefully in terms of baby industries that have a substitute nature at the domestic level. In addition, the fact that the FDI restriction index is extremely low in the sample considered within the scope of this study reveals that countries attach great importance to capital mobilization and that the expected corporate tax revenues are kept in the secondary plan.

Last but not less, FDI is a multifaceted research topic within the scope of its effects; it has multidimensional effects such as economic growth, sustainable development, macroeconomic and financial stability, and integration into international markets. Due to its widespread effects, not only in terms of total and corporate taxes but also in the context of expenditure, wealth and other types of tax need to be investigated.

6. CONFLICT OF INTEREST STATEMENT

The authors do not have any competing interests.

7. FUNDING ACKNOWLEDGEMENTS

There was no specific grant for this research from any funding source.

8. AUTHOR CONTRIBUTIONS

SCS: Idea and Investigation,
SCS: Writing – original draft,
SCS: Formal analysis and Software,
MD: Conceptualization,
MD: Writing – original draft,
MD: Supervision and Writing – review & editing.

9. ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethics committee principles were followed in the study. There has been no situation requiring permission within the framework of intellectual property and copyrights.

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Appendix 1: Empirical Literature Review

Author(s)	Sample	Period	Metod	Result
Gropp & Kostial (2000)	19 OECD	1988-1997	Panel Data Analysis	FDI has a positive impact on corporate tax revenues. Germany and Italy negatively affect corporate tax revenues in particular.
Sarısoy & Koç (2010)	21 OECD	1981-2008	Panel Data Analysis	The impact of FDI on corporate tax varies from country to country. For Türkiye, the effect of FDI on corporate tax is negative.
Mahmood & Chaudhary (2013)	Pakistan	1972-2010	ARDL	FDI has a positive effect on tax revenues.
Okey (2013)	8 WAEMU	1989-2009	2SLS-IV GMM	FDI has a positive effect on tax revenues.
Aslam (2015)	Sri Lanka	1990-2013	Time Series Analysis	FDI has a positive effect on tax revenues.
Balıkçıoğlu et al. (2016)	Türkiye	2004-2012	Panel Data Analysis	FDI has a positive effect on tax revenues.
Odabaş (2016)	EU member 7 Transition economy	1996-2012	Panel Causality Analysis	There is a unidirectional causality from FDI to tax revenues.
Jeza et al. (2016)	Ethiopia	1974-2014	ARDL	FDI; negatively affects tax revenues.
Bayar & Öztürk (2018)	33 OECD	1995-2014	Panel Data Analysis	The impact of FDI on tax revenues differs from country to country.
Bahtiyar et al. (2018)	12 EU and Türkiye	1989-2016	Panel Causality Analysis	There is unidirectional causality from tax revenues to FDI in Ireland and Spain; There is a unidirectional causality from FDI to corporate tax in Germany and Portugal.
Basheer et al. (2019)	Bahrain and Oman	1990-2010	Panel Data Analysis	FDI has a positive effect on tax revenues.
Bayar & Çelik (2019)	Türkiye	1974-2017	Time Series Analysis	FDI has a positive effect on tax revenues.
Kutbay (2019)	BRIC+T and G7W	1995-2017	Panel Data Analysis	FDI affects tax revenues positively for G7 and negatively for BRIC+T.
Sagdıç et al. (2020)	Fragile 5	1980-2018	Panel Causality Analysis	There is a unidirectional Granger causality from FDI to tax revenues.
Pratomo (2020)	80 Developing Countries	1980-2018	Unbalanced Panel Data Analysis	FDI has a positive effect on tax revenues.
Albayrak & Bozatlı (2021)	20 OECD	1971-2018	Panel Causality Analysis	Unidirectional causality has been determined from FDI to corporate tax in Germany and the USA, and from corporate tax revenues to FDI in Finland and Australia.
Camara (2022)	90 Developing Countries	1996-2017	Panel Data Analysis	FDI has a positive effect on tax revenues.

Appendix 2: Selected OECD Countries

Country	2020 Corporate Tax Rate	Country	2020 Corporate Tax Rate	Country	2020 Corporate Tax Rate
Australia	30.00	**Austria**	25.00	**Chile**	10.00
Colombia	32.00	**Costa Rica**	30.00	**Czech Republic**	19.00
Denmark	22.00	**Estonia**	20.00	**Finland**	20.00
France	32.00	**Germany**	15.83	**Greece**	15.83
Hungary	9.00	**Iceland**	20.00	**Ireland**	12.50
Israel	23.00	**Italy**	24.00	**Japan**	23.20
Korea	25.00	**Latvia**	20.00	**Lithuania**	15.00
Luxembourg	18.19	**Mexican**	30.00	**Holland**	25.00
New Zealand	28.00	**Norway**	22.00	**Poland**	19.00
Portugal	30.00	**Slovak republic**	21.00	**Slovenia**	19.00
Spain	25.00	**Sweden**	21.40	**Türkiye**	22.00
England	19.00	**United States of America**	21.00		