



THE EFFECT OF FOREIGN TRADE ON INCOME INEQUALITY: A
MULTIDIMENSIONAL PANEL DATA ANALYSIS

DIŞ TİCARETİN GELİR EŞİTSİZLİĞİ ÜZERİNE ETKİSİ: ÇOK BOYUTLU PANEL VERİ
ANALİZİ

Abdullah TAKIM¹, Sena GÜLTEKİN²



1. Prof. Dr., Atatürk Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, Uluslararası Ticaret ve Lojistik Bölümü, abdullahakim@atauni.edu.tr, <https://orcid.org/0000-0003-0187-8862>
2. Arş. Gör., Atatürk Üniversitesi, İktisadi ve İdari Bilimler Fakültesi, İktisat Bölümü, sena.gultekin@atauni.edu.tr, <https://orcid.org/0000-0002-1860-8802>

Abstract

Even if macroeconomic indicators such as economic growth, foreign trade, inflation, employment have improved in certain periods, regardless of the economic model applied and the level of development, income inequality at the global level, aside from decreasing, continues to be a political, social, demographic, ethical and economic problem. Because of this importance of income inequality, it is of great importance to reveal the macroeconomic factors that cause income inequality in detail. Although there is an important literature on income inequality, there are not many studies examining its relationship with foreign trade. While a few studies in the literature generally examine the effects of foreign trade on income inequality, this study, unlike others, investigates the effects of exports and imports, which constitute foreign trade, on income inequality. Within the scope of the study, 69 low, lower-middle, upper-middle and high income countries were examined according to the classification made by the World Bank, taking into account per capita income in the period 1995-2017. According to the results of the research, which applied multidimensional panel data analysis using two different models, it was concluded that while trade openness and imports reduced income inequality, exports increased income inequality.

Keywords: Trade Openness, Income Inequality, Multidimensional Panel Data Analysis.

Öz

Ekonomik büyüme, dış ticaret, enflasyon, istihdam vb. makro ekonomik göstergelerde belirli dönemlerde iyileşme sağlanmış olsa bile uygulanan ekonomik model ve gelişmişlik düzeyi ne olursa olsun küresel düzeyde gelir eşitsizliği azalmak bir yana politik, sosyal, demografik, etik ve ekonomik bir sorun olmaya devam etmektedir. Bu önemi dolayısıyla gelir eşitsizliğine neden olan makroekonomik faktörlerin detaylı bir şekilde ortaya konulması büyük önem arz etmektedir. Gelir eşitsizliği ile ilgili önemli bir literatür oluşmasına rağmen dış ticaretle olan ilişkisini inceleyen çalışmalar çok fazla değildir. Literatürde sınırlı sayıda yapılan çalışmalar genelde dış ticaretin gelir eşitsizliği üzerindeki etkilerini incelerken bu çalışmada diğerlerinden farklı olarak dış ticareti oluşturan ihracatın ve ithalatın gelir eşitsizliği üzerindeki etkileri araştırılmaktadır. Çalışma kapsamında 1995-2017 döneminde Dünya Bankasının kişi başına düşen geliri dikkate alarak yaptığı sınıflandırmaya göre, düşük, düşük orta, yüksek orta ve yüksek gelirli 69 ülke incelenmiştir. İki farklı model kullanılarak çok boyutlu panel veri analizi uygulanan araştırma sonuçlarına göre, ticari açıklık ve ithalat gelir eşitsizliğini azaltırken, ihracatın gelir eşitsizliğini artırdığı sonucuna ulaşılmıştır.

Anahtar Kelimeler: Ticari Açıklık, Gelir Eşitsizliği, Çok Boyutlu Panel Veri Analizi.

Makale Türü
Araştırma Makalesi

Article Type
Research Article

Başvuru Tarihi
10.12.2021

Application Date
12.10.2021

Yayına Kabul Tarihi
15.09.2022

Admission Date
09.15.2022

DOI

<https://doi.org/10.30798/makuiibf.1035237>

GENİŞLETİLMİŞ ÖZET

Çalışmanın Amacı

Gelir eşitsizliğinin azaltılması ekonomi politikalarının öncelikli amaçlarından biridir. Ekonomik büyüme, dış ticaret, enflasyon, istihdam vb. makro ekonomik göstergelerde belirli dönemlerde iyileşme sağlanmış olsa bile uygulanan ekonomik model ve gelişmişlik düzeyi ne olursa olsun küresel düzeyde gelir eşitsizliği azalmak bir yana politik, sosyal, demografik, etik ve ekonomik bir sorun olmaya devam etmektedir. Her ne kadar dış ticaretin bir bütün olarak gelir eşitsizliği üzerine etkilerini inceleyen sınırlı sayıda çalışma olsa da ithalat ve ihracatın ayrı ayrı etkilerini inceleyen çalışmalar oldukça sınırlıdır. Bu çalışmanın amacı genel olarak dış ticaretin ve bunun alt açılımını oluşturan ithalat ve ihracatın gelir eşitsizliği üzerine olan etkilerini incelemektir.

Araştırma Soruları

Dış ticaret gelir eşitsizliğini nasıl etkilemektedir? İthalat gelir eşitsizliğini nasıl etkilemektedir? İhracat gelir eşitsizliğini nasıl etkilemektedir? İşsizlik ve insani gelişme endeksi gelir eşitsizliği üzerinde nasıl bir etkiye sahiptir? Dışa açıklık oranı gelir eşitsizliğini nasıl etkilemektedir?

Literatür Araştırması

Literatür incelendiğinde, ülkelerin dış ticarete açılmasının gelir eşitsizliğini azalttığını ortaya koyan bir dizi çalışmaya rastlanmaktadır (Le, 2020; Tung vd., 2020; Barros and Teixeira, 2021). Buna rağmen, dünya pazarına erişim ve ticari maliyetler açısından yurtiçi piyasaların homojen olmadığı ülkelerde dış ticaretin eşitsizliği artırdığını ileri süren çalışmalar da bulunmaktadır (Hirte vd., 2020). Ayrıca, çeşitli ülke gruplarının dış ticaretten farklı şekilde etkilendiğini ortaya koyan çalışmalar da bulunmaktadır (Gourdon, 2011; Dorn vd., 2021). Buna ek olarak, ticaret yapılan ülkelerin gelir düzeylerinin de o ülkedeki eşitsizliği farklı şekillerde etkileyeceğini gösteren çalışmalar da bulunmaktadır (Muñoz vd., 2019). Bunların dışında ticari açıklığın gelir eşitsizliğini artırdığını söyleyen çalışmalar da oldukça yaygındır (Heimberger, 2019; Özdemir, 2020). Dış ticaretin yoksulluğu azaltsa bile eşitsizliği artırdığını iddia eden çalışmalar da mevcuttur (Anderson, 2020). İktisat literatürü incelendiğinde ithalat ve ihracatı ayrı ayrı elen alan sınırlı sayıda çalışmaya rastlanmıştır (Halmos, 2011; Hazama, 2017; Lo, 2020). Bu sonucu bulan ilk çalışmalardan biri olan Prechel'e (1985) göre, özellikle ihracata yönelik üretim yapan gelişmemiş ülkelerde gelir eşitsizliği kalkınmanın ilerleyen dönemlerinde artmaktadır. Ayrıca ihracat yapısının katma değeri yüksek mallar yönünde değiştirilmesi ve büyük ülkelere ihracat yapılması durumunda eşitsizliğin her koşulda azalmayacağını ortaya koyan çalışmalar da bulunmaktadır (Zhu vd., 2020). Bununla beraber ithalat ve ihracat için ters yönlü işaret bulan çalışmalar da bulunmaktadır (Mahesh, 2016). Literatürde insani gelişmişlik endeksindeki artış gelir eşitsizliğini azaltmıştır (Qasim vd., 2020; Taresh vd., 2021). Gelir, eğitim ve sağlık gibi en önemli eşitsizlik göstergelerini içinde barındırması nedeniyle, her üç bileşenin de etkisini yansıttığı için bu değişken eşitsizliği önemli ölçüde etkilemiştir. Buna ek olarak, literatürde insani gelişme endeksinin eşitsizliği artıracığını öne süren çalışmalar da bulunmaktadır (Akbar vd., 2018). Ayrıca farklı gelir

grubundaki ülkelerde etkinin yönünün değişebileceğini ifade eden çalışmalar da bulunmaktadır (Erkekoğlu ve Uslu, 2020). İşsizliğin ise gelir eşitsizliğini artırdığını öne süren çalışmalar vardır (Memon and Qureshi, 2021; Taresh vd., 2021). Literatür incelendiğinde ticari açıklığın gelir eşitsizliği üzerine etkileri incelenirken genelde ticari açıklığın bir bütün olarak incelendiği, ithalat ve ihracatın etkilerinin ayrıca ortaya konuşduğu çalışmaların oldukça sınırlı olduğu görülmüştür. Mevcut çalışma ile literatürdeki bu açığın kapatılması hedeflenmiştir.

Yöntem

Bu çalışmada çok boyutlu panel veri analizi uygulanmıştır. Oldukça yeni olan bu yöntem ilk olarak Baltagi, Song ve Jung (2001) çalışmasında uygulanmıştır. Panel veri modellerinde genellikle birim boyutunun etkisinin zaman boyutuna göre daha ağırlıklı olduğu görülmektedir. Böyle durumlarda çok boyutlu panel veri modelleri kapsamında iki birim ve bir zaman etkisinin dikkate alınması uygun olmaktadır (Tatoğlu, 2016). Çok boyutlu panel veri modelleri yuvalanmış ve yuvalanmamış şekilde iki türlü uygulanabilmektedir. Yuvalanmış modellerin avantajı bölge-ülke, şehir-ilçe gibi grupların etkileri ile beraber zaman etkisini de dahil ederek detaylı analiz imkânı sunmasıdır. Yuvalanmamış modeller ise genellikle çekim modelinde uygulanmaktadır (Tatoğlu, 2017). Çok boyutlu panel veri modelleri sabit ve tesadüfi etkiler varsayımı altında tahmin edilmektedir. Sabit etkiler varsayımı ile tahmin edilen çok boyutlu modeller gölge değişkenli en küçük kareler tahmincisi ve grup içi tahminci ile analiz edilmektedir. Tesadüfi etkiler modelinde ise genelleştirilmiş en küçük kareler ve en çok olabilirlik yöntemleri uygulanmaktadır (İsabetli ve Tunalı, 2018). Çalışma kapsamında gelir grubu ve ülke olmak üzere iki birim ve bir de zaman boyutu kullanılmıştır. Ülkeler WB tarafından hazırlanan listeye uygun olarak düşük, düşük orta, yüksek orta ve yüksek gelir gruplarına göre sınıflandırılmıştır. Çalışma kapsamında 1995-2017 döneminde düşük gelirli 1 ülke, düşük orta gelirli 11 ülke, yüksek orta gelirli 20 ülke ve yüksek gelirli 37 ülke yer almaktadır. Ülkeler veri setinin bulunabilirliğine göre seçilmiştir. Analiz kapsamında iki model kurulmuştur. İlk modelde ticari açıklık bir bütün olarak değerlendirilmiş; ikinci modelde ise, ithalat ve ihracatın GSYİH'ya oranı ayrı ayrı ele alınmıştır. Literatür incelendiğinde ticari açıklığın gelir eşitsizliği üzerine etkileri incelenirken çeşitli panel veri analizi methodlarından yararlanıldığı görülmüştür. Ancak bu konu çok boyutlu panel veri analizi ile daha önce incelenmemiştir. Bu yöntem sayesinde konuya etki ettiği tespit edilen birim, zaman, ve grup boyutlarının etkisi aynı anda incelenmiştir. Analiz sonuçlarına göre, ihracatın GSYİH'ya oranındaki bir birimlik artış eşitsizliği 7.780 birim ve işsizlik oranındaki bir birimlik artış eşitsizliği 0.232 birim artırmaktadır. Diğer taraftan, ithalatın GSYİH'ya oranındaki bir birimlik artış eşitsizliği 22.414 birim ve insani gelişmişlik endeksindeki bir birimlik artış eşitsizliği 38.725 azaltmaktadır.

Sonuç ve Değerlendirme

Dış ticaretin gelir eşitsizliği üzerine etkisi emeğin niteliğine göre değişmektedir. Bir yandan ticaretteki artış vasıfsız işçiye yönelik talebi artırmakta bu da gelir eşitsizliğinin azalmasını sağlamaktadır. Bu durum literatürde the Stolper-Samuelson etkisi olarak yer almaktadır. Diğer taraftan,

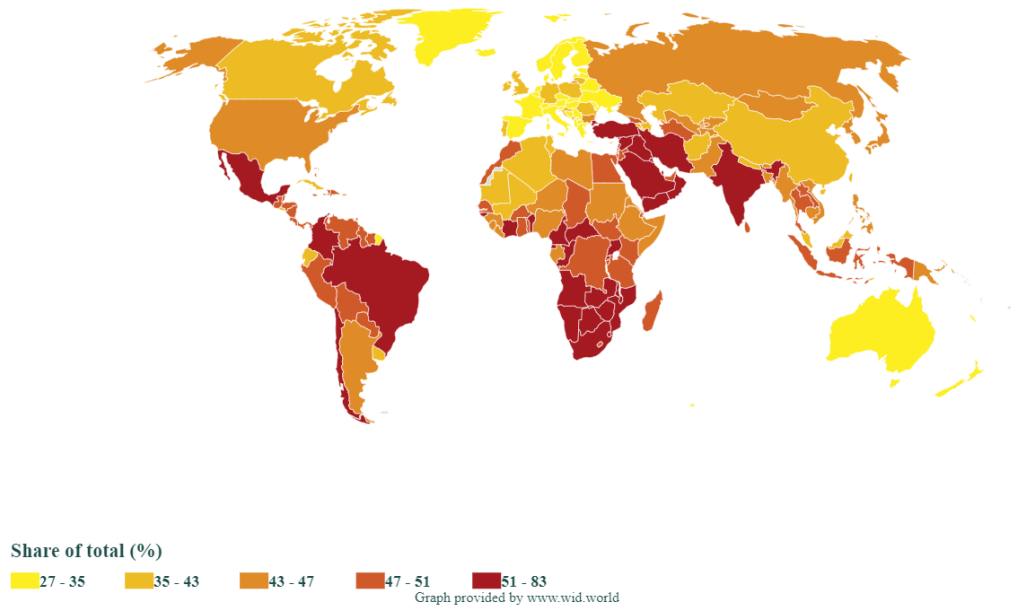
vasıflı işçilere olan taleple beraber bu işçilerin ücretleri yükselmektedir. Böylece the skill premium etkisi nedeniyle işçiler arasında gelir eşitsizliği artmaktadır (Hazama, 2017). Çalışma kapsamında yapılan analizdeki örneklem setinde yüksek ve yüksek-orta gelirli ülkeler ağırlıktadır. Dış ticarete serbestleşme ile beraber düşük vasıflı işçilerin kullanıldığı az gelişmiş ülkelerden gelen ithalatın artmasıyla gelişmiş ülkelerdeki işgücü piyasası ve gelir eşitsizliği konuları tekrar gündeme gelmiştir (Dreher and Gaston, 2008). Bu iki grup arasında artan ticaretin gelişmiş ülkelerde gelir eşitsizliğini artırdığını gösteren çalışmalar literatürde mevcuttur (Feenstra, 2000). Gelişmiş ülkelerdeki yüksek teknoloji ihracat seviyelerinin gelir eşitsizliği üzerinde negatif etkisi bulunabilmektedir. Bu ihracatın sınırlı sayıda firma tarafından yapılması ve vasıflı elemanlara yönelik talep artışı bu grupların gelirlerini yükseltmektedir. Bu durum beşeri sermayenin önemini daha da artırmakta ve gelir eşitsizliğinden temellenen eğitimde fırsat eşitsizliklerini derinleştirebilmektedir (Halmos, 2011). Özellikle gelişmekte olan ülkelerde ihracata dayalı büyümeyi teşvik edici düşük faizli krediler, enerji ve vergi bağışıklığı gibi önlemler gelir eşitsizliğini daha da artırmaktadır (Lo, 2020). Ayrıca ihracatı artırmaya yönelik az sayıda ihracatçıya verilen teşviklerin kamu kaynaklarından karşılanması sınırlı sayıda ihracatçının lehine, vergi ödeyenlerin aleyhine geliştiği için gelir dağılımını bozucu etki ortaya çıkmaktadır (Takım and Ersungur, 2018). Özellikle gelişmekte olan ülkelerin ihracatında faktör donanımına uygun olarak emek yoğun mallarda uzmanlaşmaya gidilmesi emeğin göreceli durumunu kötüleştirip gelir dağılımının bozulmasına neden olmaktadır (DPT, 2001). Bu ülkelerdeki eğitim ve sağlık gibi alanlarda bireysel gelişimi destekleyen politikaların uygulanması gelir eşitsizliğini azaltacaktır. Mevcut çalışmada insani gelişme endeksindeki ortaya çıkan iyileşmenin gelir eşitsizliğini azaltıcı yönde etkide bulunması bu yorumu destekleyici niteliktedir.

1. INTRODUCTION

On a global scale, even if traditional macroeconomic indicators such as economic growth, foreign trade, foreign direct investments, inflation, unemployment, current account balance and budget balance have improved in certain periods, income inequality continues to increase as the most important problem of the world after climate change. As an economic, political, social and ethical problem, weak measures taken at the global and local level could not reduce the income inequality between continents, countries, and even between different regions within the same country. On the contrary, inequality has steadily increased in various parts of the world. According to the World Inequality Report (2018), the lowest inequality in the world is seen in Europe, while the highest inequality is seen in the Middle East. As a matter of fact, while the richest 10% of the population in the Middle East holds 61% of the national income, this region is followed by Sub-Saharan Africa, Brazil and India with 55%, Canada with 47%, Russia with 46%, and China with 41% and Europe with 37%, respectively. Although income inequality has recently increased all over the world, this increase has not occurred equally in all regions and has increased more in North America, China, India and Russia since 1980. Figure 1 and Figure 2 show the shares of 10% with the highest income and 50% with the lowest income from national income in 2020, respectively. Although it is seen that income inequality is relatively low in developed countries, inequality is quite high throughout the world.

Figure 1. Top %10 National Income Share

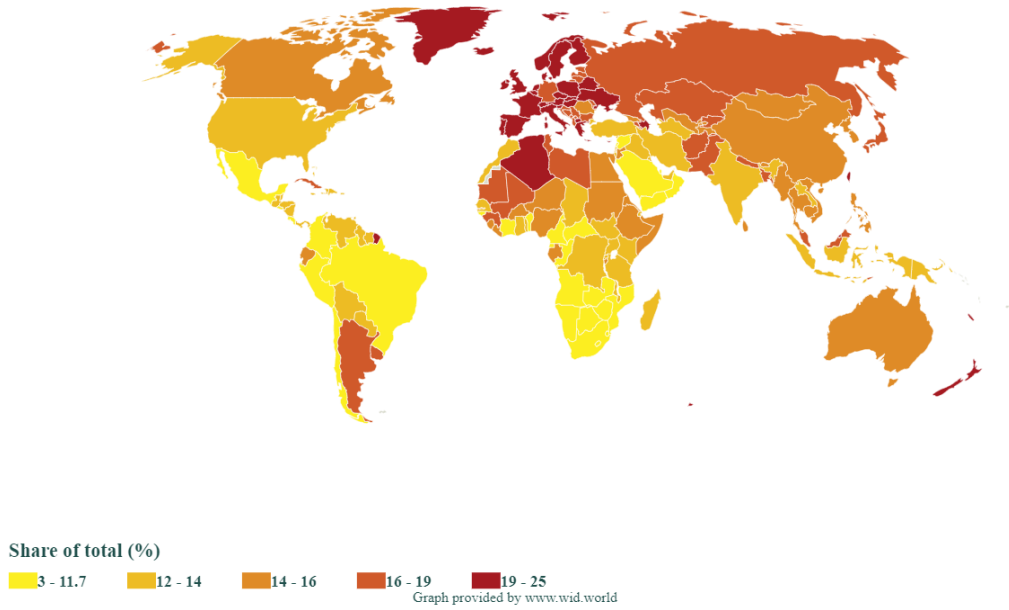
Top 10% national income share



Source: World Inequality Database

Figure 2. Bottom %50 National Income Share

Bottom 50% national income share



Source: World Inequality Database

One of the macroeconomic factors affecting income inequality is foreign trade (Lin and Fu, 2016; Wang et al., 2020; Khoso et al., 2021). Although several indicators are used in studies examining the effect of foreign trade on income inequality, one of the generally accepted economic indicators is the level of trade openness (Mahesh, 2016; Silajdzic and Mehic, 2018; Dorn et al., 2021). Although the level of trade openness of countries is accepted as a measure of integration with foreign markets, it is controversial how it affects social welfare. If a country that opens to foreign trade exports more products and imports less, both incomes will increase and a net foreign exchange inflow will be provided as much as the foreign trade surplus. For example, in the foreign trade between Turkey and China, while one unit is exported to Turkey, about eight units are imported from China. If the current foreign trade pattern does not change over time, the gradual increase in the foreign trade volume between the two countries will not bring an increase in welfare for Turkey (Takım, 2015: 51). Therefore, it is more meaningful to consider the ratio of exports and imports to GDP instead of the ratio of foreign trade volume to GDP.

Although the studies examining the relationship between openness and economic indicators such as economic growth, inflation, exchange rate, external debt, reserves and current account balance are common, the studies examining the relationship between openness and income inequality are relatively few. However, studies in the literature generally consider trade openness as a whole and ignore the possible differential effects of imports and exports. This study aims to fill this gap in the literature. The aim of this study is to examine the effects of foreign trade and imports and exports on income inequality. Within the scope of the study, 69 low, lower-middle, upper-middle and high income countries

were examined according to the classification made by the World Bank, considering per capita income in the period 1995-2017. Within the scope of the study, income inequality data calculated on disposable income obtained from The Standardized World Income Inequality Database (SWIID) was used. In the next section, firstly the theoretical framework will be given, then the analysis and finally the discussion sections will take place.

2. THEORETICAL FRAMEWORK

From past to present, different theories have been put forward about why countries take part in foreign trade. The mercantilist theory, which argues that world wealth is fixed and therefore cannot be increased through foreign trade, argues that foreign trade will only benefit one party (the exporter). According to this theory, exports should be increased and imports should be limited, a foreign trade surplus should thus be created. Physiocrats, on the other hand, argue that foreign trade is profitable in the short run and not profitable in the long run. According to the theory, since there is no demand for domestically produced goods as a manifestation of the stagnation in the economy, these goods are exported abroad (Akin et al., 2020). Starting with A. Smith, according to the classical theory, which argues that free trade is in favor of all countries, all obstacles to foreign trade such as tariffs, quotas, prohibitions should be removed (Yüksel and Sarıdoğan, 2011). When the static classical foreign trade theory, which accepts the number of production factors and technology as constant, is insufficient to explain the reasons for foreign trade, where tens of countries and thousands of goods are traded nowadays, new theories have been put forward.

Although the theories explaining the reasons for foreign trade find significant supporters in certain periods, nowadays, countries have implemented open or export-oriented foreign trade policies due to get a bigger share from world trade to finance their economic growth with foreign resources, provide capital accumulation, increase foreign exchange income and employment, integrate more with foreign markets, bring dynamism to the economy and many other reasons, instead of closed/protective policies, whose credibility is gradually losing because of this reason. As a requirement of open policies that pave the way for countries to participate more in world trade, a series of structural regulations have been implemented, from the incentive system to the tax system, from the foreign exchange regime to the measures to protect domestic producers. Even though the process of opening up, which has a dynamic feature, does not increase the welfare in every country at the same level, it has increased economic growth and per capita income in some countries as the first known effect, and thanks to the opening up, the relevant countries have been able to reach the status of high-income countries from low-income countries. South Korea, which was a middle-income country with limited natural resources in the recent past, has become a high-income country thanks to the transformation in the economy and export-oriented policies (Takım, 2017). Thanks to its open trade policies, the Chinese economy, that was the 13th largest economy in the world 30 years ago, rose to the 6th rank in 2000 with its long-term

high growth. China, the world's second largest economy in 2020, is the world's largest exporter. It is predicted that this country, where exports highly support economic growth, will become the world's largest economy soon (Takım, 2015).

As a result of the structural change in economic policies, open trade policies, which are implemented in a way that starts from real markets and includes financial markets simultaneously or with a delay, bring some problems along with new opportunities. For example, the process of opening up in real markets in order to liberalize foreign trade has increased exports in some countries, while increasing imports and foreign trade deficit more in others. As a result, although the foreign trade volume and the ratio of foreign trade volume to GDP (the ratio of trade openness) increased in some countries that implemented an open trade policy, a significant increase in welfare did not occur (Hanson, 2001). Likewise, in order to attract foreign funds to the country due to insufficient savings, the complete elimination of the restrictions on capital movements without establishing a financial infrastructure (external financial liberalization) increased the fragility of the economies and caused the relevant countries to experience frequent economic and financial crises (Takım, 2012).

The increase in trade openness, which differs according to the region, country and economic integration types on the world scale, brings along different debates about how it affects income inequality as the secondary effects as well as its expected effects such as increasing productivity, bringing dynamism to the economy, developing competitive power, attracting technology, gaining more foreign currency income, increasing production, employment and income. Import substitution and protectionist policies have been implemented in many countries for many years because of the distrust of the trade theories put forward after World War II. With the opening to foreign trade experienced in a controlled way, the increase in economic growth and the decrease in inequality in countries experiencing the Asian Miracle, countries were encouraged to foreign trade. Although this situation is not valid for every country and is based on different reasons, an environment that guides foreign trade has emerged. With the increase in inequality in the USA after the 1980s, the Heckscher-Ohlin model gained support. Accordingly, the belief that the difference between the returns of the two groups will widen in countries such as the USA with relatively high ratios of capital to labor and skilled labor to unskilled workers, on the contrary, in countries in the Asian Miracle, the belief that it will close and inequalities will decrease (Kanbur, 2015). Explaining the relationship between foreign trade and income distribution, Stolper and Samuelson opposed the long-accepted idea that "free trade is for the benefit of everyone in the country, protectionism is to the detriment of everyone" (Oğuz, 2015). According to this theory, since free foreign trade increases the income of the abundant factor of production in the country and decreases the income of the scarce production factor, income inequality in the relevant country will decrease. By assuming that capitalists are richer than those who earn their living with labor power, it is concluded that globalization will reduce inequality in developing countries (Kanbur, 2015).

3. ANALYSIS

3.1. Data

The aim of this study is to examine the effects of foreign trade and its sub-expansion, imports and exports, on income inequality. In this context, the variables in Table 1 were used in the analysis. These variables were chosen according to the literature.

Table 1. Variables Used in Analysis

Variable Name	Explanation	Source
inq	Inequality in disposable (post-tax, post-transfer) income	Solt's (2019) Standardized World Income Inequality Database Version 8-9
egdp	Exports of goods and services (current US dollars) / Gross domestic product (current US dollars)	World Bank
igdp	Imports of goods and services (current USD) / Gross domestic product (current USD)	World Bank
trade	Trade Openness	Author's own calculation
hdi	Human development index	UNDP
un	Unemployment rate, total (percent of total workforce)	World Bank

The Standardized World Income Inequality Database (SWIID), which started to be published in 2008, is frequently used because it provides income inequality data for a wide range of years for many countries. The incompleteness of the Gini index for many countries and the low observation year in existing countries highlight the SWIID data (Solt, 2016). While using the SWIID database, the indicator calculated from disposable income was used for the inequality indicator. The reason for choosing this indicator is that disposable income is used more widely than other definitions of welfare (Solt, 2020).

In the analysis made within the scope of the study, the effect of trade openness on income inequality and the effects of components of foreign trade on inequality were examined. For this purpose, two models were established. In the first model, the effect of trade openness on income inequality as a whole is examined. In the second model, the impact of imports and exports on income inequality is discussed separately. The trade openness index used in the first model was calculated with the following formula in accordance with the common usage in the literature (Mahesh, 2016; Silajdzic and Mehic, 2018; Dorn et al., 2021):

$$\text{Trade Openness} = \frac{(\text{Import} + \text{Export})}{\text{GDP}} \quad (1)$$

Two control variables, namely HDI and unemployment rate, were used in the analysis. The most important reason for choosing HDI is that it reflects not only economic growth but also development as a whole. The index reflects a long and healthy life, access to information, and a good standard of living as a whole. HDI is calculated based on life expectancy at birth, expected years of education, average years of education and GNP per capita (HDR, 2020). Thus, instead of adding these variables to the analysis one by one, the HDI variable was included in the analysis with a holistic approach. This variable

is expected to significantly affect income inequality, as it will reflect the effects of all three components. The relationship between HDI and income inequality has been frequently studied in the literature (Akbar et al., 2018; Haseeb et al., 2020; Sarkodie, and Adams, 2020). However, there are also studies that examine the relationship between the human capital index, which only takes into account the education level and income inequality (Suhendra, 2020).

Unemployment rate is another variable that has been shown to affect income inequality in the literature (Leibbrandt et al., 2012; Memon and Qureshi, 2021; Taresh et al., 2021). Unemployment rate affects not only the unemployed person but also suppresses the rise in the wage level and causes the employed to settle for fewer wages. For this reason, unemployment rate is expected to be highly influential on inequality.

In the second model, the ratios of imports and exports to GDP are separately included in the analysis to check whether the effects of trade on inequality differ when foreign trade is decomposed into imports and exports. Although there are limited number of studies in the literature that use both indicators (Mahesh, 2016; Mahadevan et al., 2017; Sukoco et al., 2020), there are also studies examining the effects only imports (Katsimi and Moutos, 2011) or only exports (Halmos, 2011; Hazama, 2017; Latzer and Mayneris, 2018; Lo, 2020) on inequality. The recent intensification of the studies draws attention to the increasing importance of the subject.

3.2. Model and Results

In this study, multidimensional panel data analysis was applied. This fairly new method was first applied in the study of Baltagi, Song, and Jung (2001). In panel data models, it is generally seen that the effect of unit size is more weighted than the time dimension. In such cases, it is appropriate to consider the effect of two units and one time within the scope of multidimensional panel data models (Tatoğlu, 2016). Multidimensional panel data models can be implemented in two ways, nested and non-nested. The advantage of nested models is that they provide a detailed analysis by including the effects of groups such as region-country, city-district, as well as time effects. Non-nested models are generally applied in the gravity model (Tatoğlu, 2017). Multidimensional panel data models are estimated under the assumption of fixed and random effects. Multidimensional models estimated with the fixed effects assumption are analyzed with shadow variable least squares estimator and within-group estimator. In the random effects model, generalized least squares and maximum likelihood methods are applied (İsabetli and Tunalı, 2018).

Within the scope of the study, two units, namely income group and country, and a time dimension, were used. Countries are classified according to low, lower-middle, upper-middle and high income groups in accordance with the list prepared by WB. Within the scope of the study, 1 low-income country, 11 lower-middle-income countries, 20 upper-middle-income countries and 37 high-income countries are included in the 1995-2017 period. Countries were selected based on the availability of the

dataset. Two models were established within the scope of the analysis. In the first model, ratio of trade openness was evaluated as a whole; in the second model, the ratio of imports and exports to GDP was handled separately. The first model of the study, which was analyzed with the multidimensional nested panel data method, was established as follows:

$$\text{inq}_{ijt} = \beta_0 + \beta_1 \text{trade}_{ijt} + \beta_2 \text{hdi}_{ijt} + \beta_3 \text{un}_{ijt} + \mu_i + \gamma_j + \lambda_t + u_{ijt} \quad (2)$$

Here, i shows the unit size of the countries, j shows the country groups classified according to income groups, and finally, t shows the time dimension. μ_i is the country effect, γ_j is the income group effect, and λ_t is the time effect. First of all, the significance of each effect individually and together was tested with the LR test. Altogether, in paired or individually set LR tests, the hypotheses are that the standard errors of the unit effects are equal to zero. The results of the 1st model LR test are given in Table 2.

Table 2. Model 1 LR Test Results

Null Hypothesis	LR Test Statistics
$H_0 = \sigma_\mu = \sigma_\gamma = \sigma_\lambda = 0$	4492.71*
$H_0 = \sigma_\mu = \sigma_\gamma = 0$	4481.32*
$H_0 = \sigma_\mu = \sigma_\lambda = 0$	4474.65*
$H_0 = \sigma_\gamma = \sigma_\lambda = 0$	277.15*
$H_0 = \sigma_\mu = 0$	4463.93*
$H_0 = \sigma_\gamma = 0$	237.34*
$H_0 = \sigma_\lambda = 0$	20.08*

Note: * indicates significance at the 1% significance level.

According to the LR test result, all H_0 hypotheses were rejected. It has been revealed that the country, income group and time effects are significant and the three-dimensional panel data method is appropriate in the analysis process of the model. Then, the model was estimated with fixed and random effects. The 1st model estimation results are as given in Table 3 and Table 4.

Table 3. Model 1 Fixed Effects Estimation Results

		trade	hdi	un	F Testi	R ²
Shadow Least Squares Estimator	Variable	2.017815*	1.332652	0.072406*	597.59*	0.9738
Within Estimator	Group	-7.485646*	-34.07954*	0.3133859*	1337.35*	0.7169

Note: * indicates significance at the 1% significance level.

Table 4. Model 1 Random Effects Estimation Results

	trade	hdi	un	Wald
Maximum Likelihood Estimator	1.862873*	-6.939783*	0.0647459*	96.06*

Note: * indicates significance at the 1% significance level.

When Table 3 and Table 4 are examined, it has been determined that all three models are significant as a result of the F statistics and Wald test of the models. However, the shadow variable OLS

estimator is not preferred because it causes a loss of degrees of freedom by adding a shadow variable to the model (Tatoğlu, 2018: 300). For this reason, the shadow variable OLS results are not consistent. It was, therefore, decided to interpret the within-group estimator in the analysis results. According to the within-group estimator results, the explanatory power of the model is quite high. In addition, all variables are significant at the 1% significance level. According to the results of the analysis, a one-unit increase in trade openness reduces inequality by 7,486 units, and a one-unit increase in HDI reduces inequality by 34,080 units. On the other hand, a one-unit increase in unemployment rate increases inequality by 0.313 units.

When the literature is examined, there are a number of studies that reveal that opening countries to foreign trade reduces income inequality in accordance with the findings of this study (Le, 2020; Tung et al., 2020; Barros and Teixeira, 2021). However, there are also studies suggesting that foreign trade increases inequality in countries where domestic markets are not homogeneous in terms of access to the world market and commercial costs (Hirte et al., 2020). There are also studies showing that various country groups are affected differently by foreign trade (Gourdon, 2011; Dorn et al., 2021). In addition, there are studies showing that the income levels of trading countries will also affect inequality in that country in different ways (Muñoz et al., 2019). Apart from these studies mentioned above, studies stating that trade openness increases income inequality are also quite common (Heimberger, 2019; Özdemir, 2020). There are also studies in the literature claiming that foreign trade increases inequality even if it reduces poverty (Anderson, 2020).

Consistent with the literature, the increase in the human development index reduced income inequality (Qasim et al., 2020; Taresh et al., 2021). In addition, the fact that the biggest effect in the analysis belongs to the human development index meets the expectations. Since it contains the most important indicators of inequality such as income, education and health, and reflects the effects of all three components, this variable has had a significant impact on inequality. In addition, there are studies in the literature suggesting that the human development index will increase inequality (Akbar et al., 2018). There are also studies stating that the direction of the effect may change in countries with different income groups (Erkekoğlu and Uslu, 2020). According to the results of the analysis, it is seen that unemployment rate increases income inequality in line with expectations. The results are consistent with the literature (Memon and Qureshi, 2021; Taresh et al., 2021).

While applying the second model, the trade openness variable was excluded from the model, instead, the ratios of imports and exports to GDP were included in the model. The second model of the study, which was analyzed with the multidimensional nested panel data method, was established as follows:

$$\text{inq}_{ijt} = \beta_0 + \beta_1 \text{egdp}_{ijt} + \beta_2 \text{igdp}_{ijt} + \beta_3 \text{hdi}_{ijt} + \beta_4 \text{un}_{ijt} + \mu_i + \gamma_j + \lambda_t + u_{ijt} \quad (3)$$

Here i shows the unit size of the countries, j shows the country groups classified according to income groups, and finally, t shows the time dimension. μ_i is the country effect, γ_j is the income group effect, and λ_t is the time effect. First of all, the significance of each effect individually and together was tested with the LR test. The results of the 2nd model LR test are as given in Table 5.

Table 5. Model 2 LR Test Results

Null Hypothesis	LR Test Statistics
$H_0 = \sigma_\mu = \sigma_\gamma = \sigma_\lambda = 0$	4263.30*
$H_0 = \sigma_\mu = \sigma_\gamma = 0$	4250.88*
$H_0 = \sigma_\mu = \sigma_\lambda = 0$	4245.18*
$H_0 = \sigma_\gamma = \sigma_\lambda = 0$	199.11*
$H_0 = \sigma_\mu = 0$	4233.39*
$H_0 = \sigma_\gamma = 0$	137.15*
$H_0 = \sigma_\lambda = 0$	58.47*

Note: * indicates significance at the 1% significance level.

According to the LR test result, all H_0 hypotheses were rejected. It has been revealed that the country, income group and time effects are significant and the three-dimensional panel data method is appropriate in the analysis process of the model. Then, the model was estimated with fixed and random effects. The 2nd model estimation results are as given in Table 6 and Table 7.

Table 6. Model 2 Fixed Effects Estimation Results

	egdp	igdp	hdi	un	F Testi	R ²
Shadow Variable Least Squares Estimator	3.617129*	-8.127376	.7158524	.0696207*	583.34*	0.9735
Within Group Estimator	7.779531*	-22.41367*	-38.72513*	.231634*	1230.25*	0.7566

Note: * indicates significance at the 1% significance level.

Table 7. Model 2 Random Effects Estimation Results

	egdp	igdp	hdi	un	Wald
Maximum Likelihood Estimator	3.484376*	-.9238547	-6.641056*	.0614828*	77.85*

Note: * indicates significance at the 1% significance level.

In parallel with the first model, it was decided to interpret the within-group estimator in the analysis results. According to the within-group estimator results, the explanatory power of the model is quite high, and all variables are significant at the 1% significance level. According to the results of the analysis, a one-unit increase in the export/GDP rate increases inequality by 7.780 units and a one-unit increase in unemployment rate increases inequality by 0.232 units. On the other hand, a one-unit increase in the import/GDP rate reduces inequality by 22,414 units, and a one-unit increase in the human development index reduces inequality by 38,725.

Looking at the results of the second model, it is seen that although the coefficients of the human development index and unemployment rate differ compared to the first model, their signs are the same. The main differentiation between the two models emerges when imports and exports are included in the model. When the economics literature was examined, studies supporting the results of the current analysis were found (Halmos, 2011; Hazama, 2017; Lo, 2020). According to Prechel (1985), one of the first studies to find this result, income inequality increases in the later stages of development, especially in underdeveloped countries that produce for export. In addition, there are studies that show that inequality will not decrease under all circumstances if the export structure is changed toward high value-added goods and exports are made to large countries (Zhu et al., 2020). However, there are also studies that find reverse signs for imports and exports (Mahesh, 2016).

4. DISCUSSION

High and upper-middle income countries predominate in the sample set in the analysis made within the scope of the study. With the liberalization in foreign trade and the increase in imports from underdeveloped countries where low-skilled workers are used, the issues of labor market and income inequality in developed countries have come to the fore again (Dreher and Gaston, 2008). There are studies in the literature showing that increased trade between these two groups increases income inequality in developed countries (Feenstra, 2000). When the results are examined, the finding that the increase in imports reduces income inequality supports this situation. The fact that imports reduce income inequality in a group with a high density of developed countries is in line with this theory and meets expectations. However, in order to examine the theory more clearly, country groups should be separated and analyzed one by one.

The high-tech mode of production in developed countries and the highly educated workers working in these places earn a lot more than the workers in underdeveloped and developing countries, which leads to a greater increase in income inequality between countries. Especially in the exports of developing countries, specialization in labor-intensive goods, under the factor endowment, worsens the relative situation of labor and causes the income distribution to deteriorate (DPT, 2001). Implementation of policies that support individual development in areas such as education and health in these countries will reduce income inequality. The fact that the human development index reduces income inequality in the current study supports this interpretation.

When countries are opening up to foreign trade, the current conditions within the country should not be ignored. When the inequalities in education and health opportunities are combined with the inequalities caused by foreign trade, the problems deepen. These inequalities cause individuals who cannot reach adequate education to be unemployed or to find jobs with low wages, which in turn causes inequalities to deepen. Therefore, before determining the foreign trade policies of the countries, it is necessary to determine the sources of inequalities within the country and to take steps to eliminate them.

The fact that the coefficient of the human development index is so high as a result of the study revealed that inequality is closely related to the internal dynamics of the countries. Therefore, besides examining the countries with different economic and social characteristics as a whole, it is important to examine the internal dynamics of the respective countries one by one. Ongoing studies will examine the effects of foreign trade on inequality on a country's basis.

REFERENCES

- Akbar, U. U., Aimon, H. and Yulhendri, Y. (2018). Analysis and Prospect of Economic Growth and Income Inequality in West Sumatra Province. *In 2nd Padang International Conference on Education, Economics, Business and Accounting (PICEEBA-2 2018)* (pp. 950-960). Atlantis Press.
- Akin, M. H., Karamustafa, K. ve Öztürk, Y. (2020). Uluslararası Ticaret Teorilerinden Destinasyon Rekabetçiliği Modellerine Geçiş: Kavramsal Bir İnceleme. *Bolu Abant İzzet Baysal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 20(1), 203-228.
- Anderson, E. (2020). The Impact of Trade Liberalisation on Poverty and Inequality: Evidence from CGE Models. *Journal of Policy Modeling*, 42(6), 1208-1227.
- Baltagi B., Song S.H. and Jung B. C. (2001). The Unbalanced Nested Error Component Regression Model. *Journal of Econometrics*, 101(2), 357-381.
- Barros, D. and Teixeira, A. A. C. (2021). Unlocking the Black Box: A Comprehensive Meta-Analysis of The Main Determinants of Within-Region Income Inequality. *Review of Regional Research*, 41(1), 55-93.
- Dorn, F., Fuest, C. and Potrafke, N. (2021). Trade Openness and Income Inequality: New Empirical Evidence. *Economic Inquiry*, 1-22.
- DPT, (2001). Gelir Dağılımının İyileştirilmesi ve Yoksullukla Mücadele Özel İhtisas Komisyonu Raporu, Online Source: https://www.sbb.gov.tr/wp-content/uploads/2018/11/08_GelirDagilimi.pdf
- Dreher, A. and Gaston, N. (2008). Has Globalization Increased Inequality?. *Review of International Economics*, 16(3), 516-536.
- Erkekoğlu, H. ve Uslu, H. (2020). Gelişmiş Ve Gelişmekte Olan Ülkelerde Kalkınma Ve Gelir Eşitsizliği İlişkisi: Dinamik Panel Veri Analizi. *Ekonomik ve Sosyal Araştırmalar Dergisi*, 16(2), 489-509.
- Feenstra R. (2000). *What are the Results of Product-Price Studies and What Can We Learn from their Differences?*. The Impact of International Trade on Wages, Chicago: University of Chicago Press for NBER.
- Gourdon, J. (2011). Openness and Inequality in Developing Countries: A New Look at The Evidence. CERDI - UMR CNRS 6587 - Université Clermont 1, E 2007.09. Online Source: <https://halshs.archives-ouvertes.fr/halshs-00557117/document>
- Halmos, K. (2011). The Effect of FDI, Exports and GDP on Income Inequality in 15 Eastern European Countries. *Acta Polytechnica Hungarica*, 8(1), 123-136.
- Hanson, G. (2001). Should Countries Promote Foreign Direct Investment?. G-24 Discussion Papers 9, United Nations Conference on Trade and Development
- Haseeb, M., Suryanto, T., Hartani, N. H. and Jermisittiparsert, K. (2020). Nexus Between Globalization, Income Inequality and Human Development in Indonesian Economy:

- Evidence from Application of Partial and Multiple Wavelet Coherence. *Social Indicators Research*, 147(3), 723-745.
- Hazama, Y. (2017). The impact of exports on income inequality in developing countries (No. 650). Institute of Developing Economies, Japan External Trade Organization (JETRO).
- HDR (2020) Human Development Reports, Technical Notes, Online Source: http://hdr.undp.org/sites/default/files/hdr2020_technical_notes.pdf
- Heimberger, P. (2020). Does Economic Globalization Affect Income Inequality? A Meta-Analysis. *The Vienna Institute for International Economic Studies Working Paper* 165
- Hirte, G., Lessmann, C. and Seidel, A. (2020). International Trade, Geographic Heterogeneity and Interregional Inequality. *European Economic Review*, 127, 103427.
- İsabetli, İ. ve Tunalı, H. (2018). Toplam Faktör Verimliliği ve Ekonomik Büyüme İlişkisinin Çok Boyutlu Panel Veri Modeli İle Analizi. *Akademik Araştırmalar ve Çalışmalar Dergisi (AKAD)*, 10(18), 189-199.
- Kanbur, R. (2015). *Globalization and Inequality*. In Handbook of income distribution (Vol. 2). Elsevier.
- Katsimi, M. ve Moutos, T. (2011). Inequality and the US Import Demand Function. *Journal of International Money and Finance*, 30(3), 492-506.
- Khoso, N. A., Rajput, S., Aziz, T., Hussain, A. and Jahanzeb, A. (2021). Trade Openness and Income Inequality: Fresh Evidence Based on Different Inequality Measures. *Applied Economics Journal*, 28(2), 63-81.
- Latzer, H. and Mayneris, F. (2018). Average income, income inequality and export unit values. *CES Working Papers*, halshs-01901256. Online Source: <https://halshs.archives-ouvertes.fr/halshs-01901256>
- Le, T. H., Nguyen, C. P., Su, T. D. and Tran-Nam, B. (2020). The Kuznets Curve for Export Diversification and Income Inequality: Evidence from A Global Sample. *Economic Analysis and Policy*, 65, 21-39.
- Leibbrandt, M., Finn, A. and Woolard, I. (2012). Describing and Decomposing Post-Apartheid Income Inequality in South Africa. *Development Southern Africa*, 29(1), 19-34.
- Lin, F. and Fu, D. (2016). Trade, Institution Quality and Income Inequality. *World Development*, 77, 129-142.
- Lo, C. P. (2020). Wage Inequality, Unemployment, and Export-Oriented Policy. *The Singapore Economic Review*, 65(06), 1753-1772.
- Mahadevan, R., Nugroho, A. and Amir, H. (2017). Do Inward Looking Trade Policies Affect Poverty and Income Inequality? Evidence from Indonesia's Recent Wave of Rising Protectionism. *Economic Modelling*, 62, 23-34.
- Mahesh, M. (2016). The Effects of Trade Openness on Income Inequality-Evidence from BRIC Countries. *Economics Bulletin*, 36(3), 1751-1761.
- Memon, S. and Qureshi, I. A. (2021). Income Inequality and Macroeconomic Instability. *Review of Development Economics*, 25(2), 758-789.
- Muñoz, T. M. G., Baleix, J. M. and Odeh, O. O. (2019). Inequality in Latin America: the role of the nature of trade and partners. *Economics Discussion Papers*, No 2019-59. Kiel Institute for the World Economy.
- Oğuz, O. (2015). Gelişmiş ve Gelişmekte Olan Ekonomilerde Dışa Açıklık ve Gelir Dağılımı İlişkisi. In *EY International Congress on Economics II (EYC2015)*, November 5-6, 2015, Ankara, Turkey (No. 271).

- Özdemir, O. (2020). The Handicap for Enhanced Solidarity Across Advanced Economies: The Greater the Economic Openness Higher the Unequal Distribution of Income. *Annals of Public and Cooperative Economics*, 91(4), 585-632.
- Qasim, M., Pervaiz, Z. and Chaudhary, A. R. (2020). Do Poverty and Income Inequality Mediate The Association Between Agricultural Land Inequality and Human Development?. *Social Indicators Research*, 151, 115-134.
- Prechel, H. (1985). The Effects of Exports, Public Debt, and Development on Income Inequality. *The Sociological Quarterly*, 26(2), 213-234.
- Sarkodie, S. A. and Adams, S. (2020). Electricity Access, Human Development Index, Governance and Income Inequality in Sub-Saharan Africa. *Energy Reports*, 6, 455-466.
- Silajdzic, S. and Mehic, E. (2018). *Trade Openness and Economic Growth: Empirical Evidence from Transition Economies*. In Trade and Global Market. Trade and Global Market, IntechOpen, Rijeka, Ch. 2.
- Solt, F. (2016). The Standardized World Income Inequality Database. *Social Science Quarterly*, 97(5), 1267-1281.
- Solt, F. (2019). The Standardized World Income Inequality Database, Versions 8-9, Harvard Dataverse, V6. Online Source: <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/LM4OWF>
- Solt, F. (2020). Measuring Income Inequality Across Countries and Over Time: The Standardized World Income Inequality Database. *Social Science Quarterly*, 101(3), 1183-1199.
- Suhendra, I., Istikomah, N., Ginanjar, R. A. F. and Anwar, C. J. (2020). Human Capital, Income Inequality and Economic Variables: A Panel Data Estimation from a Region in Indonesia. *The Journal of Asian Finance, Economics, and Business*, 7(10), 571-579.
- Sukoco, S., Hartono, D. and Patunru, A. (2020). The Impacts of Liberalization and Trade Facilitation on Economic Performance, Poverty and Income Inequality: An Analytical Study. *Economic Journal of Emerging Markets*, 12(1), 67-79.
- Takım, A. (2012). Dış Finansal Liberalleşme Sonrası Türkiye'nin Dış Borç Dinamiğindeki Değişmeler: Bir Literatür Araştırması. *Sosyoekonomi*, 18(18), 23-44.
- Takım, A. (2015). *Uluslararası Ticarete Giriş Kavram, Teori, Politika ve Uygulama*. Genişletilmiş ve Gözden Geçirilmiş 2. Baskı, Ekin Basım Yayın.
- Takım, A. (2017). *Türkiye'nin Temel Ekonomik Sorunları, Politik Aktörler Tarihsel Veriler ve Öngörüler*. Ekin Basım Yayın, Bursa.
- Takım, A. ve Ersungur, Ş. M. (2018). Türkiye'de Teşvik Sisteminin Yapısı, Sorunları ve Etkinliği Üzerine Bir Politika Önerisi: Tek Bir Uygulamacı Kuruluş Sorunları Çözer Mi?. *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 32(3), 725-744.
- Taresh, A. A., Sari, D. W. and Purwono, R. (2021). Analysis of The Relationship Between Income Inequality and Social Variables: Evidence from Indonesia. *Economics & Sociology*, 14(1), 103-119.
- Tatoğlu Yerdelen, F. (2016). Various Approaches for the Estimation of the Three-Dimensional Fixed and Random Effect Models. *Eurasian Academy of Sciences Eurasian Econometrics, Statistics&Empirical Economics Journal*, 5, 60-70.
- Tatoğlu Yerdelen, F. (2017). Avrupa Ülkelerinde Okun Yasasının Çok Boyutlu Panel Veri Modelleri ile Analizi. *Yönetim ve Çalışma Dergisi*, 1(1), 43-56.
- Tatoğlu Yerdelen, F. (2018) *Panel Veri Ekonometrisi: Stata Uygulamalı*. Beta Yayınları, İstanbul.

- Tung, L. T., Thang, P. N. and Uyen, L. T. (2020). Does Economic Integration Affect Inequality in Developing Countries? Evidence from A Global Sample. *European Journal of Sustainable Development*, 9(2), 579-579.
- Wang, M., Park, N. and Choi, C. H. (2020). The Nexus between International Trade, FDI and Income Inequality. *Journal of Korea Trade*, 24(4), 18-33.
- World Inequality Report 2018, Online Source:
<https://wir2018.wid.world/files/download/wir2018-full-report-english.pdf>
- Yüksel, E. ve Saridoğan, E. (2011). Uluslararası Ticaret Teorileri ve Paul R. Krugman'ın Katkileri. *Öneri Dergisi*, 9(35), 199-206.
- Zhu, S., Yu, C. and He, C. (2020). Export Structures, Income Inequality and Urban-Rural Divide in China. *Applied Geography*, 115, 102150.