

SEEJE

South-Eastern Europe Journal of Economics

THE OFFICIAL JOURNAL OF THE ASSOCIATION OF ECONOMIC UNIVERSITIES
OF SOUTH AND EASTERN EUROPE AND THE BLACK SEA REGION

Vol 19 | No 1 | SPRING 2021

web site: <http://www.asecu.gr>
ISSN 1109-8597
ISSN On line: 1792-3115



FUNDING INSTITUTION
UNIVERSITY OF MACEDONIA
THESSALONIKI, GREECE

SEEJE

Editorial Office:

ASECU, University of Macedonia

156 Egnatia Str., 546 36 Thessaloniki, Greece

tel: +30 2310 891 793, fax: +30 2310 891 748

e-mail: asecu@uom.edu.gr

web site: <http://www.asecu.gr>

© ASECU

ISSN 1109-8597

ISSN On line: 1792-3115

Thessaloniki, Spring 2021

contents

Articles

- Looking to the Future: The Historical Acquis on Cooperation in Eastern Europe and the Black Sea as a Cornerstone for a Progressive-European Integration**
GRIGORIS ZAROTIADIS 7
- Impact of the Level of Economic Development on the Generation of Plastic Waste Within the European Union**
VIOLINA KIRILOVA 21
- Public Debt and Economic Growth: A Review of Contemporary Literature**
NIKOLAOS FILIPPAKIS, THEODOROS V. STAMATOPOULOS 33
- Corporate Governance, Cost of Capital and Tobin Q: Empirical Evidence from Turkey Listed Companies**
BERNA DOĞAN BAŞAR 51
- The Nexus Between Commodity Terms and National Terms of Trade of Sub-Sahara African Countries: Implication for Intersectoral Linkage**
ANU KESHIRO TORIOLA, EMMANUEL OLADAPO GEORGE,
WALID GBADEBO ADEBOSIN 79

aim and scope of

ASECU was founded in 1996 as Association of South-Eastern Europe Economic Universities with the general aim of promoting the interests of those economic universities in South-Eastern Europe which are public, recognized or financed by the state of origin.

By decision taken in General Assembly of 2007, it was modified *in Association of Economic Universities of South and Eastern Europe and the Black Sea Region*. Presently, Universities and Research Centers are included to the active Full members of ASECU from Albania, Armenia, Bosnia-Herzegovina, Bulgaria, Greece, Montenegro, North Macedonia, Poland, Romania, Russia, Serbia, Slovakia, Turkey and Ukraine. Also, as Associated members, Universities form Egypt, China, Hungary, Kazakhstan, Lebanon and Palestine.

The specific aims of the Association are:

To promote cooperation between Economic Universities, Faculties, Departments; i.e., especially: a) to exchange views and information about syllabi, b) to exchange undergraduate and postgraduate students and c) to exchange teaching and research staff.

To provide members with the opportunity exchange information, opinions etc. by publishing a relevant scientific journal or by cooperation in elaborating scientific studies in relation to the future development of higher education and research as well as to improve their quality in the field of economic studies and business administration.

To undertake initiatives for the protection of the interests of members and their institutions, so as to be supported by international organizations and in particular by the higher education institutions of the European Union.

To encourage cooperation between universities inside and outside the countries referred to in the Association.

To pursue cooperation in the field of higher education with the consolidation of close relations with other organisations having similar aims, e.g. E.U.A.;

To provide opportunities for harmonising the degrees of faculties and departments of the universities participating in the Association;

To promote cooperation between economic universities, faculties, departments in the field of research for the benefit of the economy, the society, peace and the cultural development of the countries referred to the Association.

Presidency and Board Members

The following Board was elected for a four years period, during the 7th General Assembly of ASECU, on the 30th of March 2019.

Grigorios Zarotiadis, President

Aristotle University of Thessaloniki, Thessaloniki, Greece

Oleg Bodyagin, Vice President

Rostov State University of Economics, Rostov-on-Don, Russia

Leonid Nakov, General Secretary

“Ss Cyril and Methodious” University, Skopje, North Macedonia

Fatmir Memaj, Member

University of Tirana, Tirana, Albania

Dejan Mikerević, Member

University of Banja Luka, Bosnia - Herzegovina

Paskal Zhelev, Member

University of National and World Economy, Sofia, Bulgaria

Vesna Karadžić, Member

University of Montenegro, Podgorica, Montenegro

Bogdan Wierzbinski, Member

University of Rzeszów, Rzeszów, Poland

Zaklina Stojanović, Member,

University of Belgrade, SERBIA

LOOKING TO THE FUTURE: THE HISTORICAL ACQUIS ON COOPERATION IN EASTERN EUROPE AND THE BLACK SEA AS A CORNERSTONE FOR A PROGRESSIVE-EUROPEAN INTEGRATION

GRIGORIS ZAROTIADIS
Aristotle University of Thessaloniki, Greece

Abstract

The vision for a democratic, socially just and environmentally balanced Europe, the modern cradle of humanitarianism and peace, a vision that moved European people and spread the mood for European integration through the enlargement of the European Union (EU), fades away. The unfortunate coincidence of aggressive neoliberalism with neo-fascist socio-political retrogression, along with the gradual sharpening of the international systemic crisis in the sphere of the economy, requests a reorientation of the progressive vision for cooperation and prosperity. The historic *acquis* on socioeconomic cooperation and cultural linkages in Eastern Europe and the Black Sea could become the foundation for re-establishing the prospects of European Integration. The core-periphery approach has run its course, especially when the “core” is deteriorating. In the present paper, rather than arguing in favour of “Eastern enlargement”, i.e., a structure with visible signs of relapse and breakdown, we discuss the usage of a regionally developed, effective and progressive “Eastern partnership” that may become the cornerstone for a European restart.

JEL Classification: F53, O19, R58

Keywords: European vs community *acquis*, Eastern partnership and enlargement, progressive European integration.

Corresponding Address: **Grigoris ZAROTIADIS**, President of the *Association of Economic Universities of South and Eastern Europe and the Black Sea Region (ASECU)*, Dean of the Faculty of Economic and Political Sciences, Aristotle University of Thessaloniki, University Campus, 54124 Thessaloniki, Greece. Email: gzarotia@econ.auth.gr

1. Introduction

The vision for a democratic, socially just and environmentally sustainable Europe, the modern cradle of humanitarianism and peace, a vision that moved European people and spread the mood for European integration through the enlargement of EU, is fading away.

In the place of the European dream an unpleasant reality has emerged: (i) cross-regional disparities have been getting deeper over the last three decades since the 1980s. Standard deviation of GDP per capita for the 15 EU core member-countries started growing from the lowest level of 0.41 up to 0.52, back to the levels of the early 1960s. At the same time, (ii) labour average remuneration has lost almost 30% against per capita income in the same area (EU-15): from being more than 1.65 of per capita GDP in the late 1970s, it fell to almost 1.35 in the following three decades (Zarotiadis and Gkagka, 2013). In the political scene, (iii) technocratic legitimisation is gradually taking over, replacing the democratic tradition of the north-western part of the Old World. The unfortunate coincidence (iv) of aggressive neoliberalism with neo-fascist socio-political retrogression, along with the gradual sharpening of the international systemic crisis in the sphere of the economy, has generated a rather discouraging socioeconomic environment that has proved incapable of dealing with major, peripheral crises.

In order to succeed in having a progressive way-out, it is necessary for the European vision for cooperation and prosperity to change orientation. The present paper balances an academic and a political approach. It combines the inevitably limited objectivity of scientific arguments with daringly honest, unveiled political positions. Thereby, the paper seeks to provide answers for the future of Europe, having, on the one hand, the “neo-liberalisation of Europeanisation” and, on the other, the prospect for a renewed, modernised progressive vision.

In that sense, the historic *acquis* on socioeconomic cultural co-existence in Eastern Europe and the Black Sea could become the foundation for re-establishing the prospects of European Integration. The core-periphery approach has run its course, especially when the “core” is deteriorating. In the present paper, rather than arguing in favour of the “Eastern enlargement” of a structure with visible signs of relapse and breakdown, we discuss the usage of a regionally developed, effective and progressive “Eastern partnership” that may become the cornerstone for a European restart. In a past paper, Zarotiadis and Lyratzopoulou (2014) analysed the prospects of an inter-regional, cross-national cooperation in South and Eastern Europe by reintroducing the historical ideas of Rigas Feraios and other thinkers of this region (Dandashly, 2012).

South, Eastern Europe and the Black Sea provide an area where, despite the broad mixture of national and cultural identities and the resulting intense diversity, enhanced cultural, business and socioeconomic interrelations generate a fertile environment

for collaboration. In our days, the emergence of new countries and, consequently, the establishment of new frontiers has led to fundamental changes in economic, political, social, and cultural patterns, as well as to more pronounced heterogeneity and complexity in transnational cooperation. Nevertheless, it has been shown that there are ways to reorganise existing institutions for transnational collaboration in the area, co-integrated in a mutual context of democratically legitimised, social, and environmental sustainability, taking into consideration local and ethnic specificities.

In the present paper we go one step further in this direction. We first conceptualise the main problems existing in contemporary Europe – the “neo-liberalisation of the Europeanisation” and the “stretching out” case. Next, we proceed with our “stepping back to progress” proposal, rebuilding a regenerated, progressive European integration on pre-existing regional linkages and the currently emerging socioeconomic and environmental necessities. For this, we take into consideration the emerging polarisation in contemporary global economy and the resulting socio-political tendencies. The paper concludes on the prospects of Eastern Europe and the Black Sea in a rapidly changing world of worryingly intensified risks but also-promising opportunities.

2. Neo-liberalisation of Europeanisation and the “stretching out” case

As we mentioned in the introductory remarks, there are two main transformations that dominate contemporary Europe. The first one is a result of the conservative response to the generalised systemic crisis, initiated by severe disturbances in global financial markets in the second half of the 21st century first decade. Neo-liberalisation is a well-documented political trend based on ideological and theoretical foundations since the late 1970s that became gradually hegemonic, especially after the global changes of the 1990s¹.

The EU was rooted in the Economic Cooperation Act of 1948 (Marshall Plan): a Keynesian strategy of international orientation laid the foundations for the eventual unification of European countries. In the meantime, Keynesian economics was grafted with the “continental” tradition of bourgeois liberalism, leading to what literature calls “Europeanisation”. All this changed around the 1980s. The recent transformation into a neo-liberal monetary union is in absolute accordance with the overall evolution of the pro-capitalistic political scene of our times.

Neo-liberalism is the necessary response to post-imperialistic capitalism, given the rapid deterioration of systemic bottlenecks. Depressed and restricted by the spatial limitations and the excessive credit expansion, modern bourgeois policy adopted the necessarily modernised² “self-destruction of production means «as the only way-out. As geographical and credit expansion ran their course, as technological evolution restricts marginal costs and counter-acts commercialisation, there is nothing else

1. See Zarotiadis, 2012, as well as Duman, 2014.

2. The last historical experiences along with the tremendous evolution of military forces makes it imperative that we should be more careful.

but to sacrifice small and medium sized businesses, deregulate the necessary socio-political interventions and abolish the achievements of bourgeois social state, privatise social goods and branches of the public sector (Zarotiadis, 2013). Neo-liberalism is simply nothing more than an attempt to form new prospects of rewarding re-investments for the internationally over-accumulated capital that keeps being spoiled by the excessive profits of financial speculations. Thereby it recreates a new “El-Dorado”, which is very much needed at a time of deepening inequality, overproduction, and over-accumulation of capital.

In the framework of the European Union, this political conversion should not be perceived as a simple switch of political parties in the governments of member-states. It is, rather, of a ‘horizontal’ political nature, transcending the different political identities that governed Europe (and the world) till that point. This conversion can be summarised in the notion of **transforming the historical European Acquis into a “Community Acquis”**:

- First, the notion of “Freedom” is being converted in the request for “Market Liberalisation”, which is by no means the same thing. This results in aggressive deregulations and abolishes the structures of the European welfare state, which resulted from historical, systemic compromises.
- Second, the other foundation of the European Acquis, namely democratic legitimisation is being gradually substituted by Technocracy: political power moves towards those we have the right to decide and implement due to their assumed technocratic and cognitive supremacy.

The case of Central Bank sovereignty and independence, as well as the institutionalisation of automatic mechanisms and independent authorities to control fiscal policy is a change in this direction.

BBC celebrated the change in Italian and Greek government in November 2011 as an indication for the new era where technocrats take over: “Goodbye, Berlusconi and Papandreou. Hello, Monti and Papademos... According to Marco Incerti of the Centre for European Policy Studies in Brussels, *technocrats, by reputation, competence, and experience, can persuade the markets and eurozone leaders that they represent change*”³.

In the EU-summit of December 2011 another major episode in this direction was fulfilled: decision making in the newly established European Stability Mechanism (ESM) required a majority of 85% of contributing funds. A similar political indication can be found in the statement by the German Chancellor in the same period: “we have achieved a breakthrough to a Stability Union. A fiscal union, or stability union as I call it...” Nevertheless, in the BBC article mentioned above, Kevin Featherstone (London School of Economics) recalls the major concerns with respect

3. <https://www.bbc.com/news/magazine-15720438>

to technocratisation: “technocrats bring a reputational advantage both in terms of knowledge and a sense of putting national interests above party political interests... but there are disadvantages too and sooner rather than later the democratic process will need to be restarted”. Indeed, this is because we need to draw our attention back to the tradition of political philosophy (Bangura, 2004): political questions do not have a single correct answer – therefore, such issues cannot be simply a subject of a superior wisdom or experience. They must be decided in a socially justified, effective manner.

Neo-liberalism, albeit consistent with the fundamental foundations of capitalist ethic and seemingly palliative, did not prove to be effective, not even in terms of rebalancing the system. Social and interregional contrasts were accentuated, much more and much faster than forecast, long before the financial capital had been sufficiently persuaded to invest in real economy. At the same time, induced self-destruction concerns had already jumbled and upset holders of financial derivatives, there by inducing aggressive competitive behaviour. They were engaged in a race to be first in transforming their redundant financial means into control of the scarce means of production. A race that has resulted in regional (for the time being) conflicts.

This leads us to the second main transformation that dominates contemporary Europe. Allow us to proceed with an allegorical approach to explain this development: a ‘small’-size sweater can never fit a heavyweight boxer. If you try it, the result will be to damage the sweater – any pre-existing tiny imperfections will turn into unmanageable holes. This is the case of the hasty regional enlargement of a unification process – the (Eastern) enlargement of EU, which had some defects or, at least susceptible to having several imperfections that proved to be unmanageable after the “**stretching-out**”:

- it was and still is a far too much economy-biased unification process, during which the dimension of socio-political integration has remained undeveloped;
- issues of state and national safety, common foreign policy, but also transnational coordination in terms of health, education and research, are still lagging behind (despite the evolving normative framework);
- furthermore, especially in the framework of the European Monetary Union, it is a financially biased process, in that the issues of fiscal policy, synchronisation of taxation, or aspects of socially and environmentally sustainable re-industrialisation are held back, due to absence of political legitimisation of relevant decision making;
- finally, any steps of political coordination have a clear neoliberal character – think, for instance, of the content in the “Treaty Establishing a Constitution for Europe”.

The interesting and, at the same time, worrying thing is that this politically defective process of unification resulted in an inability to deal with peripheral emergencies – the refugee crisis being the latest incidence – which, in turn, degrades even more the prospects of successful, spatial, and sectoral Europeanisation.

3. Possibilities for South-Eastern Europe and the Black Sea

Anastasakis & Bojicic-Dzelilovic (2002, p. 2) provide a definition of the term (cross- or inter-) regional cooperation: “a more flexible type of interaction, accommodating diverse groups of states, economies and cultures dominated by ideas of opening and promoting mutual interdependence”. Regional cooperation is a process that allows governments, local authorities, social partners, producers, and civic society to implement initiatives for “common action” and “networks of independence” to be achieved. Thereby, the regions outstrip physical and/or political borders. The resulting interaction in issues related to production, administration, security, culture, education etc. provokes local economic prosperity, socio-cultural understanding, and respect, while it strengthens citizens’ participatory attitude and mentality for cooperation. In this sense, regional cooperation also acts as an effective democracy-building process.

Nevertheless, the cooperation process for countries in the same region may entail various difficulties. Over time, neighbouring involves not only co-operation but also competition, confrontation, and conflicts, which, in turn, generate immaterial counter-attitudes such as “national pride, political tensions, lack of trust, high coordination costs and asymmetric distribution of costs and benefits”. These behavioural patterns along with the lack of well-recognised, cross-national administrative and political procedures generate obstacles for conducting and realising regional agreements (Shiffand Winters 2002).

Anastasakis and Bojicic-Dzelilovic (2002) moved on to distinguish two groups of factors playing an important role in achieving cross-national, regional cooperation agreements between countries. On the one hand, there are external forces resulting from concentrated political and economic interests for the specific region but generated in other regions and/or in a global context. External factors may have a pro- or anti-cooperation effect, which, however, depends on what serves extraterritorial interests. Therefore, even when these factors facilitate cross-regional agreements, cautiousness is necessary to succeed in serving local benefits. On the other, internal factors refer both to the historically evolving socio-cultural, political, and economic linkages, either with a positive or a negative sign, as well as the currently rising requirements for the wider region, identifying common interests among the countries being integrated that will lead to common initiatives and projects.

In this context, we can move on and define the factors that motivate and those that hinder regional cooperation, specifically in South-East Europe. Geographical proximity and the regional nature of problems (organised crime, border control, environmental issues, underdeveloped infrastructure are cases that should be handled in a cooperative manner by all countries in the same region) constitute factors of an urgent character. Moreover, the idea for regional cooperation is also promoted by structural arguments of deeper relevance, such as the insignificant size of each individual market and its expansion potentials, historical links, cultural similarities, and internal socioeconomic pressures. Though these factors may not be considered urgent by “local elites”, Zarotiadis and Lyratzopoulou, (2014) anticipate that these are

to become the main objectively motivating factors.

Concerning the factors hampering regional cooperation among countries in South-Eastern Europe and the Black Sea, following the methodology described above, we can first focus on the hetero-determination of local stake holders' aspirations and their dependence on extraterritorial interests, which in turn hinder the emergence of region-specific requirements and necessities. Relevant literature emphasizes the lack of consensus regarding the benefits of regional cooperation, mostly because this is very often considered to be insignificant by "local elites"; given their already mentioned inter-dependence, they regard this as an unnecessary political preciousity with little impact for their actual interests (Anastasakis & Bojicic-Dzelilovic, 2002).

In addition to complications resulting from the specific profiles of local stakeholders, the non-complimentary economic structure, ethnic and cultural differences, a lack of security, peoples' lack of trust, weak legal frameworks (e.g., widespread corruption), the different level of bilateral relations with the EU, the absence of political vision and, finally, inadequate infrastructure in the region constitute additional obstacles. According to Petrakis (2014) and other scholars, those spatial irregularities constitute the main cause for the economic problems the EU is experiencing today. Nevertheless, all countries in the region that are part of the Union and all those planning their accession, must bear in mind that their integration will reinforce the process of convergence and will also improve the prospects of cooperation with their neighbours, thereby, constituting a way towards stability and prosperity.

Unfortunately, these expectations have been discouraged. The procrustean financial benchmarks – e.g., the "Maastricht" Criteria, wages and prices flexibility, increased labour mobility and fiscal equalisation – have not had the intended effect of alleviating preceding asymmetries between countries (Bergs 2001). Instead, given that those benchmarks were applied in economic areas not yet homogenous enough, pre-existing divergences became even deeper, causing further shocks to the process of Europeanisation. Less developed economies lacking competitiveness felt even 'lower' (at least in relative terms) (Zarotiadis and Gkagka, 2013) – becoming a member of a dissimilar socioeconomic environment, with different needs for sustaining one's position against the intensified competition from abroad, was not helpful in bridging the gap between those lagging and the most prosperous ones (Ascani *et al.*, 2012). The 28 countries that were already EU-members introduced a rather distinctive character, with different rates of economic, political, and social growth and development, which hindered the symbiosis of these countries within the European Union and prevented their full integration.

The decade-long convergence policy has proved to be ineffective. This is because the transfer of resources was not accompanied by policies for boosting local productive development but were limited to the sphere of consumption. This consumption boost to local, supportive societies was distributed among local classes in a provocatively unequal manner.

Here lies one of the main arguments of this paper: before integrating, for instance, Sweden with Malta, to avoid continuous troubles, attention should be first paid on regional cooperation and integration, so that countries belonging to the same macro-region (a term that has been presented for the first time in EU slang because of the so-called “macro-regional strategies”) and sharing analogous levels of development, closer historical links and similar socioeconomic, cultural and political frameworks, will be able to co-create and implement an appropriate strategy for interrelated co-development. Aydin (2005) argues that regional cooperation constitutes a tool promoting “regional and global security and stability”. Collaborating countries within the same region can facilitate organised action against issues that set humanity in danger, such as organised crime, terrorism, drugs, weapons, and human trafficking, promoting, thereby, stability and security regionally and globally. Furthermore, through regional cooperation countries can establish behaviours to deal with economic, social, political, environmental, and cultural issues and in doing so build a “shared identity”.

Examining the sub regions of South Eastern Europe separately⁴, the region surrounding the Black Sea is characterised by ethnic diversities, religious heterogeneity, cultural and language differences. One could also mention differences in the size of the countries, their economic structures and political orientation. The region’s weak background created favourable conditions for external players to penetrate, competing to promote their own products in the new open markets. The area is quite favoured geographically and strategically: being connected to the Mediterranean constitutes a convenient bridge between Europe, Asia and Africa with increasing military-strategic and geo-economic importance (Homorozean, 2010).

Despite the volatile and uncertain economic and political environment, the Black Sea region has entered the world economy, since two of its countries, namely, Russia and Turkey, are in the G20group, while the presence of the European Union in the region is apparent after the accession of Bulgaria, Greece, and Romania (Manoli, 2014). Consequently, given the long-lasting intercultural, business, and socioeconomic relations historically generated, the region constitutes a fertile environment for promoting regional cooperation and integration (Zarotiadis & Lyratzopoulou, 2014).

Since the 1990’s, the Black Sea region has been undergoing a long period of transition, during which a series of strengthening reforms have taken place and economic networks have been created, mainly in terms of trade links among its countries, financial transactions, labour mobility, technology transfer and tourism relationships. Apart from the efforts made by Black Sea countries on their own, there are also several cooperation initiatives undertaken by external actors (Homorozean, 2010). Indicatively, we can mention the Organisation for the Black Sea Economic Cooperation (BSEC), the Black Sea Synergy (BSS) and Eastern Partnership (EaP), both EU initiatives familiarising Western Black Sea countries with the “Europeanisation Process”,

4. The following presentation of the main characteristics of the region repeats a similar analysis in Zarotiadis and Lyratzopoulou 2015.

the international organisation Community of Democratic Choice (CDC), initiated by Georgia and Ukraine, and the EU-led schemes of the so-called Baku Initiative and Energy Community aiming at promoting energy production, transport and transit.

Regarding the Balkan region, things are kind of different, since “the states in this region are on a path toward membership in the EU”, even if this process evolves at a time when the EU experiences internal turmoil. Similarly, there are common features among Balkan countries, which facilitate their regional cooperation and integration. Apart from geography and proximity, they share common history that has shaped cultural, political, and economic bonds among the states, enabling better understanding among people as well as economic/political elites. Since almost all Balkan countries experience a transition period, leading to underdevelopment and lack of security, there are common regional problems that could be dealt with only via joint action. Additionally, most of these states have already become members of groups like the Central European Free Trade Area (CEFTA) or the Danube Commission, denoting, thereby, a common basis of political and economic interests (Anastasakis and Bojicic-Dzelilovic, 2002).

However, the same features that enable cooperation also constitute an impediment. For example, history and geographic proximity is one of the factors that either promotes or hampers cooperation between countries, since each country is differently impacted. Other factors hindering cooperation are stunted inter-regional trade, due to similar economic structures and production of almost the same products, the ongoing efforts for democratisation, the lack of human, social and institutional capital, and, finally, the presence of ethnic nationalism.

The above lead to the conclusion that South-Eastern Europe is an advantageous field for exploiting historical links -both positive and negative- that spread beyond present-day spatial boundaries of state entities. Ironically, at the same time, the Balkans and the Black Sea create trouble and challenges that do not promote the idea of Europeanisation. Kempe & Klotzle (2006), having a rather unjustified denunciatory attitude, argue that full integration and realising the vision for a “whole and free” Union seems rather distant, since Balkan and Black Sea countries lack coherence and threaten stability and security in their regions, thus preventing Europe from achieving its goal. Even if it is rather unacceptable to blame countries lagging for the weaknesses of the process of European unification, we can conclude that while persisting with the “stretching-out” strategy is ineffective, the same regions within which this strategy failed, can become the basis of a new process that initiates integration first at local/regional level.

4. Stepping back to proceed?

Even though many may wonder whether the accession of South-Eastern countries during the great enlargement in 2004 and the EU expansionary intentions to the Balkans and the Black Sea could halt European integration, there is an unquestionable opportunity and need for emphasising the socioeconomic cooperation in South-

Eastern Europe and the Black Sea; this, however, should take place in the framework of a process that will be sufficiently different than the “stretching-out” strategy. The key to resolving the issue is the idea of regional cooperation and integration within the two regions before proceeding towards a wider amalgamation.

Let us recall the arguments mentioned in the previous section: regional cooperation can establish the necessary behavioural standards and build a “shared identity”. That way, the countries of the region can get themselves prepared for their accession to larger organisations, such as the EU, where deeper social and economic integration and adoption of certain norms and standards will be needed. Considering what was previously addressed, i.e., the two main transformations in contemporary Europe – the neo-liberalisation of Europeanisation and the “stretching out” case – that led to specific dysfunctions and weaknesses of the spatial expansion and the sectoral deepening of the EU, along with the possibilities discussed, which exist because of pre-existing historical, cultural, political and socio-economic linkages in several peripheries of Europe (South-Eastern Europe and the Black Sea region are examples of this), one can be led to the proposal of “stepping back to proceed”; this can be summarised as follows:

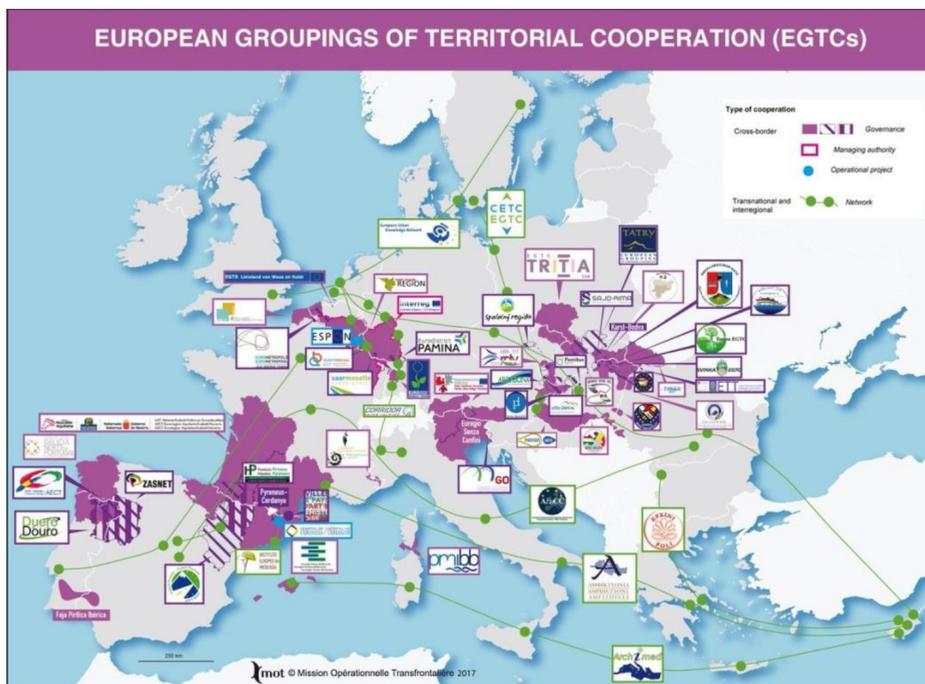
- The EU core-periphery approach has run its course, especially since the “core” is deteriorating. The structural transformation of the historical European Acquis in the Community Acquis of neo-liberal content described above speaks for that.
- The historic legacy of socioeconomic cooperation and cultural linkages in South-Eastern Europe, (Eastern) Mediterranean, the Black Sea and even the Caspian Sea could become the foundation for re-establishing prospects for progressive integration. Even from a European perspective, rather than arguing for the “Eastern enlargement” of a structure with visible signs of relapse and breakdown, we should discuss the usage of a “Mediterranean, Black Sea and Caspian Partnership” that will function as one of the cornerstones for an eventual restart.
- Think for instance of a Seas of Cooperation and Sustainability (SCS) Project, in perfect harmony with the Sustainable Development Goals of the UN 2030 strategy, developed along the following dimensions: Blue Growth; Social and Environmental Sustainability; Peace, Security and Safety; Freedom and Respect; Preservation of Diversity/Enhancement of Communication; Quality over Quantity in production and the related trend for de-Commercialisation⁵

5. Zarotiadis (2016) argues in more details about this: “Evolution of competition and, thereby, market structure, on the one hand, and of technology, on the other, generate an endogenous socialisation process. Capitalist competition itself is the driving force of a counter-systemic technical change...” as it “leads to de-commercialisation” by inducing vast decreases in the marginal costs over fix costs ratio. Next to the theoretical analysis, Zarotiadis continues with a relevant policy remark: (i) this endogenous process of de-commercialisation places barriers in the usage of “technological revolution” as a way-out of the systemic crisis; (ii) there is an alternative to artificial excludability: structural reforms that enhance the efficiency of the public sector, while broadening the socialised sector of the economy.

- towards a new era of democratically legitimised socioeconomic processes.
- Finally, consider the existing frameworks and institutional/financing instruments that can be used in this direction, for instance the macro-regional strategies, the Euro-region projects (e.g., Euroregion Carpathia), the European Groupings for Territorial Cooperation (EGTC), the Sustainable Development Solutions Networks (SDSNs) in the framework of the UN, etc.

Specifically for the case of EGTCs, not only is it a truly useful institutional instrument, but the way these corporations are spread in the European continent highlights the possibilities of promoting progressive partnerships that go beyond the frontiers of modern European countries and replicate pre-existing socio-economic and state regimes (see the following map) in (i) the Franco-Roman area and the Iberian Peninsula, Benelux and the Austro-Hungarian space⁶.

Diagram 1. Map of EGTCs and their Logos in Oct. 2017



Source: Réseau de la Mission Opérationnelle Transfrontalière (MOT) / Network of the Transfrontier Operational Mission

6. Despite existing possibilities for cross-regional cooperation in the Balkans and the north-western Black Sea shore, EGTCs were completely absent there, with the exception of the relatively new EGTC Helicas (https://portal.cor.europa.eu/egtc/CoRAactivities/Pages/EGTC_HELICAS.aspx). This absence has to do with the meagre progress of EU-integration in the specific area.

Instead of being a belt of antagonism and casualties, South Eastern Europe and even the wider area of (Eastern) Mediterranean, the Black Sea and the Caspian could become a bridge of understanding, co-creation, and cooperation. Regional cooperation and ultimately, integration are gradual, long-term, complex, and slow processes that presuppose strong basis. Since global institutions are unable to deal with the needs of each region (in relation to environmental, social, fiscal, and similar issues), in time neighbouring states and societies can take the initiative to cooperate and deal with such challenges.

Even if the process of regional integration is laborious and difficult, it is still a useful prerequisite condition for the creation of wider unifications – and especially so for the European one, where the intensity and the density of historical processes create socio-cultural and economic disparities that cannot be simply overcome by hasty financial amalgamations. When political procedures prove to be desperately cursory, due to existing contemporary socioeconomic pressures, stepping back and trying to resolve resulting shortages is necessary and effective. In that sense, reorientation towards regional cross-national integration should not be perceived as being antagonistic to the process of European unification; on the contrary, it is an indispensable prerequisite condition.

5. Europe in a changing world

The special characteristic of our time is not the changes that happen, but the continuously intensifying pace of change (Zarotiadis, 2017). On the bright side, one could support that this rapidly evolving reality, exponentially increasing labour productivity and consequent restoration of the significance of use value, as economies of quality replace economies of scale. On the contrary, we need to consider (i) the disturbances that result from the continuously growing financial over-accumulation, which, in turn, is the outcome of globalised crises of over-production, as well as (ii) the newly arising bipolarity and imperialism of supranational corporations.

Europe must redefine its position between the Atlantic political, military and newly economic alliance, on the one hand (consider CETA and TTIP), and the Sino-Russian composition, on the other, between the traditional, compromised, and neo-liberalised western Bourgeoisie and the newly arising, contesting, and demanding authoritarian neo-capitalisms of the East. In this rapidly evolving socioeconomic and political environment, Europe should (and can) find its new, contemporary, special role. For this, South Eastern Europe and the Black Sea can become a cornerstone:

- due to the importance of the region in the framework of the newly arising bipolarity,
- the strong historical, contemporary socio-economic and environmental linkages, and
- the necessities that arise from the high severity of environmental and socioeconomic issues in the specific region.

- The above promote progressive ideas and strong prospects of alternative solutions – for instance Blue Economy and No-Drilling-Zone in Eastern Mediterranean and the Black Sea.

Contemporary global evolution verifies that sustainability cannot be achieved spontaneously. Intervention is necessary, whether intergovernmental or cross-regional (districts and municipalities); so are social partners, universities, and R&D institutions. In other words, history never stops, yet progress is not guaranteed. Either we will shape history, or we will suffer the lack of Progress. With respect to this dilemma, South Eastern Europe and the Black Sea can be extremely important.

References

- Anastasakis O. and Bojicic-Dzelilovic V., 2002, “Balkan regional cooperation & European integration”, Policy papers (2). Hellenic Observatory, London School of Economics & Political Sciences, London, U.K.
- Ascani A., Crescenzi R. and Iammarino S., 2012, “Regional economic development: A review”, *SEARCH Working Paper*, No. WP1/03, <http://www.ub.edu/searchproject/wp-content/uploads/2012/02/WP-1.3.pdf>
- Aydin M., 2005, “Regional cooperation in the Black Sea and the role of institutions”, *Center for Strategic Research*, Autumn 2005, pp.57-83.
- Bangura Y., 2004, “Technocratic Policy Making and Democratic Accountability”, *UNRISD Research and Policy Brief 3*, UNRISD/RPB3e/04/3
- Bergs R., 2001, “EU Regional and Cohesion Policy and Economic Integration of the Accession Countries”, Policy Research & Consultancy Discussion Paper, Available at SSRN: <https://ssrn.com/abstract=297437>
- Dandashly A., 2012 “European Integration Revisited—From the Founding Fathers to the Normative Power Europe”, *Journal of European Integration*, 34(4):419-426.
- Duman Ö.S., 2014, “The rise and consolidation of neoliberalism in the European Union: A comparative analysis of social and employment policies in Greece and Turkey”, *European Journal of Industrial Relations*, 20(4):367-382.
- Homorozean A., 2010. “Regional Black Sea architecture and consequences for the regional cooperation framework”, *Romanian Journal of European Affairs*, 10(4), pp.5-25.
- Kempe I. and Klotzle K., 2006, “The Balkans and the Black Sea region: Problems, potentials and policy options”, *Bertelsmann Group for Policy Research Policy Analysis*, No.2.
- Manoli P., 2014, “Regional cooperation the Black Sea”, *Black Sea Trade and Development Bank Paper*. http://www.bstadb.org/publications/Regional_Cooperation_in_the_Black_Sea.pdf
- Petrakis P., 2014. “Greece and the Eurozone: Staying or leaving?” in B. Temel, ed. *The Great Catalyst: European Union Project and Lessons from Greece and Turkey*, United Kingdom: Lexington Books. pp.9-34.
- Schiff M. and Winters L.A., 2002, “Regional Cooperation, and the Role of International Organizations and Regional Integration”, *Policy Research Working Paper - No. 2872*, World Bank, Washington, DC. © World Bank.
- Zarotiadis G., Gkagka A., 2013, “European Union a Diverging Union”, *Journal of post-Keynesian economics*, Vol. 35.2013, 4, p. 537-567.
- Zarotiadis G. and Lyratzopoulou D., 2014, “Feraios revised: Inter-regional trans-national socio-economic cooperation in South and Eastern Europe”, *International Relations and Diplomacy*, 2(12), pp.829-835.

- Zarotiadis G. and Lyratzopoulou D., 2015. Rebuilding Socio-Economic Cooperation in South East Europe and the Black Sea for Restarting European Integration, *Eurasian Journal of Social Sciences*, 3(4), 46-52.
- Zarotiadis, G. 2012, *Neoliberalism: Vulgarly Simple or Simply vulgar?* Dardanos- Gutenberg, Athens.
- Zarotiadis G., 2013, "Greece and the European Union: Neo-liberalism and Its Discontents" in Bülent Temel, *The Great Catalyst: European Union, Project and Lessons from Greece and Turkey*, Lexington Books.
- Zarotiadis G., 2016, "Technological Change, Public Goods and New Insights into the Socialization of Production", Proceedings of the 12th ASECU Conference, Anadolu University, Eskisehir.
- Zarotiadis G., 2017, "Technology-Change Changes: Implications for Universities and R&D-Sector", Bulletin of Taras Shevchenko National University of Kyiv. Economics, 2017; 2(191): 50-54.

IMPACT OF THE LEVEL OF ECONOMIC DEVELOPMENT ON THE GENERATION OF PLASTIC WASTE WITHIN THE EUROPEAN UNION

VIOLINA KIRILOVA*

D. A. Tsenov Academy of Economics, Bulgaria

Abstract

In 2015, in New York City, the UN voted and adopted the so-called “Sustainable Development Agenda - 2030”, which includes 17 main goals, related to the transformation of the world and the achievement of “a better and more sustainable future for all.” These aims are focused on “global challenges”, faced by developed and developing countries alike. One of the main issues affected by the programme is environmental degradation. Today the challenge that all humanity stands before is how to reduce the negative impact that human beings have on the nature around us through our day-to-day activities. The main pollutant to be investigated is plastic – one of the principal compilers of the “World Waste Crisis”. The aim of this paper is to assess the impact of the level of economic development on the generation of plastic waste within the European Union, measured by regression. Therefore, this paper investigates the statistical data of plastic waste generation in EU countries for the 2004-2016 period and the trends in gross national income per capita for all countries investigated. The results of this paper suggest that the impact of the level of economic development has direct influence on the purchasing power of society, and, hence, positive dependence between consumption growth, waste generation, and one of the world’s most widely used materials - plastics.

JEL Classification: F63, Q01, Q53

Keywords: Generation of Plastic Waste, Economic Development, Regression, European Union, World Waste Crisis

The paper has been awarded by the Board of ASECU with the Tsekouras Prize for Young Economists, in 2020. A first form of the paper has been also presented in the 16th International Conference of ASECU, Novosibirsk, Russia, November 2020.

Corresponding Author:* **Violina KIRILOVA, D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. E-mail: violinakirilova@gmail.com

Scientific advisor: **Galina Stefanov**, Head Assistant, D. A. Tsenov Academy of Economics, Svishtov, Bulgaria. E-mail: g.stefanov@uni-svishtov.bg

Introduction

We live in a fast-paced high-tech world. Thousands, millions of creative ideas, are generated across the globe in a single day. The development that humanity strives for every minute indisputably gives us many benefits, which have facilitated and continue to help our daily life. However, creating a 'richer' world of possibilities and innovations has its positive meaning, negative effects are not absent. There are many socio-economic issues, such as poverty, child labour, corruption, unemployment, illiteracy, energy crisis, inflation, overpopulation, and unequal income distribution. However, today we are facing another enormous problem - the World Waste Crisis and the pollution resulting from it. Undoubtedly, this can be considered one of the biggest problems for our ecosystem. It entails immense hazards for the Earth and its resources and leads to extremely unfavourable conditions not merely for living but survival itself.

In 2015, in New York City, in order to take a step towards solving the problems affecting humanity, the United Nations voted and adopted the so-called "Sustainable Development Agenda-2030". This strategy includes 17 main goals, related to the transformation of the world and the achievement of "a better and more sustainable future for all". (United Nations, n.d.). These goals are focused on "global challenges", faced by developed and developing countries alike. One of the main issues of concern for the programme is environmental degradation. Today, the challenge all humanity encounters is how to reduce the negative impact that we, as human beings, have on nature around us through our day-to-day activities and how to develop a more sustainable economy sparing nature.

Literature review

The main pollutant to be examined in this paper is the PLASTIC – one of the greatest inventions in human history and, at the same time, one of the most hazardous materials for the environment and the health of every individual on Earth.

The history of this "incredible good" is long, but the important year in the timeline is 1907, when "the first synthetic thermoset polymer (a phenol-formaldehyde [PF]), known as Bakelite, was created in 1907 by Baekeland through the polycondensation of phenol with formaldehyde". "The commercial development of this PF material is considered to be the beginning of the truly synthetic plastic era and of the plastic industry." (Feldman, 2008). According to the Science History Institute, this breakthrough "was revolutionary. For the first time, human manufacturing was not constrained by the limits of nature. Nature only supplied so much wood, metal, stone, bone, tusk, and horn." (Science History Institute, n.d.)

As the world's population continues to grow its needs are increasing as well. Finding ways to meet these needs is crucial for increasing the chances of survival and continued development. That is why humans should create new ideas that can be turned into

real materials, parts of the new economy type in the world. Since its inception, plastic has been gaining popularity and was quickly marketed as an innovative, much more practical, inexpensive, and affordable material from all strata of society. Its features make plastic easy to process and shape, and this, in turn, makes it a useful substitute for many of the more expensive and hard-to-get materials used in the past.

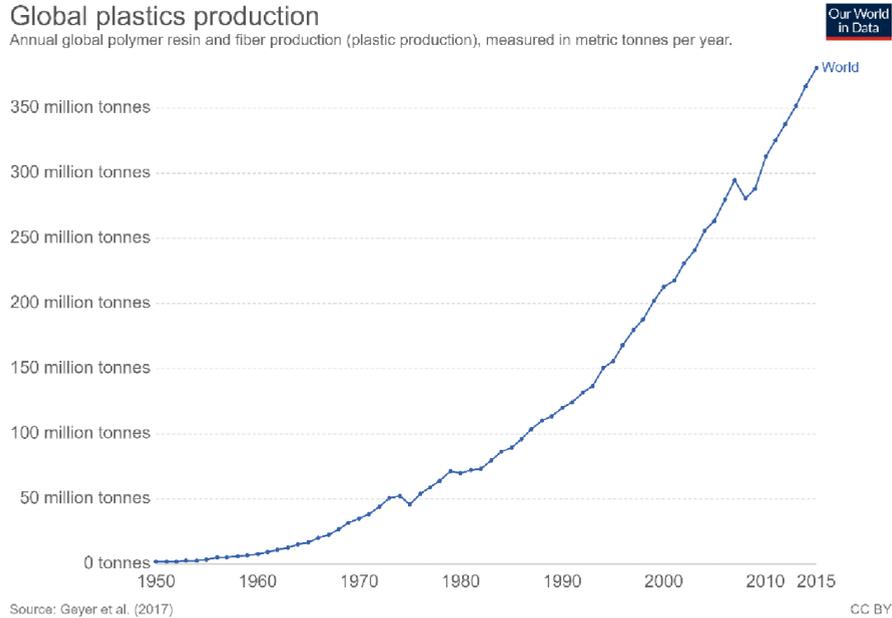
In the beginning, “this development helped not only people but also the environment. Advertisements praised celluloid as the saviour of the elephant and the tortoise. Plastics could protect the natural world from the destructive forces of human need.” (Science History Institute, n.d.)

On the other hand, we have been using plastic for years and years now and its footprints ubiquitous. Because of the wide use of plastic, we are witnessing a terrible negative impact on nature. Due to the impossibility of its complete biodegradability today, we are facing an enormous problem. The impact can be seen on land and in water. “Due to high disposability and low recovery of materials discharged, plastic materials have become debris accumulating in the environment.” (Rocha-Santos & C Duarte, 2015) All this affects life throughout the ecosystem. Animals die because of choking or poisoning after plastic waste ingestion. Polluted soil and water affect all users of these land resources. Consequently, destruction of life around us is observed, affecting not only of humanity but also of other inhabitants of this planet.

According to early research by Rochman, Cook and Koelmans (2016), since “Capitan Charles Moore introduced the world to the ‘Great Pacific Garbage Patch’ in the mid-1990s”, “there has been increasing interest from scientists, the public, and policymakers regarding plastic debris in the environment.” (Rochman, Cook, & Koelmans, 2016). It is clear that plastic is truly one of the main culprits behind the deaths of so many living creatures, as well as global warming, ocean pollution and climate change. Recently, there has been increasing awareness of the ‘plastic issue’ and active involvement of people in the effort to do something about it. Many other studies by various scientists have shown that plastic waste does have an irreversible negative impact on the environment.

As stated in the scientific publication “Plastic Pollution” (Ritchie & Roser, 2018) world plastic production has grown from some 2.00 million tonnes per year in 1950 to 381 million tonnes in 2015. (*Chart 1.*) This means that over these 65 years, “annual production of plastics increased nearly 200-fold. For context, this is roughly equivalent to the mass of two-thirds of the world population” (Ritchie & Roser, 2018).

Chart 1. Global Plastic Production



Source: "Our World in Data"

As it has become clear, plastic has many physical advantages over other materials. Due to its low cost, it is widely spread and used. What exactly affects the usage of plastic and what are the ways to reduce its use? According to Speth's article (1988), "today's pollution is integrally related to economic production, modern technology, lifestyles, the sizes of human and animal populations, and a host of other factors." (Speth, 1988) From this standpoint, it becomes clear that the economy is one of the main factors involved in plastic use and plastic waste generation.

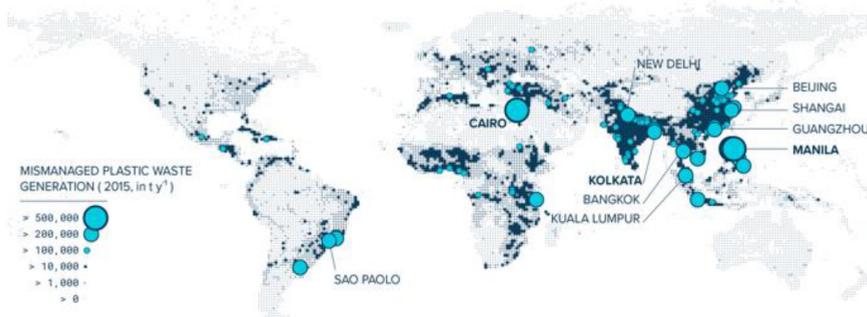
The aim of this paper is to assess the impact of the level of economic development on plastic waste generation. The chosen objects of this study are the countries of the European Union. Therefore, this paper investigates statistical data concerning the generation of plastic waste per capita in EU countries for the 2004-2016 period and the trends in the gross national income per capita for all countries investigated.

This study is designed to assess the hypothesis that the higher the income of the population, the more plastic waste is generated, due to increased purchasing power that makes plastic items, which eventually become waste after consumption, affordable.

Before understanding the connection between gross national income and plastic pollution per capita in the EU, let us first consider where the EU ranks in the world plastic pollution list.

The article by Lebreton and Andrady (2019) presents plastic as a main pollutant for 2015 (Fig. 1.) It shows that the Asian continent was “the leading generating region of plastic waste with 82 Mt, followed by Europe (31 Mt) and Northern America (29 Mt). Latin America (including the Caribbean) and Africa each produced 19 Mt of plastic waste, while Oceania generated about 0.9 Mt.” (Lebreton & Andrady, 2019)

Fig. 1. Global mismanaged plastic waste generation in 2015



Source: “Palgrave communications; Humanities Social Sciences”

According to another publication related with the topic, Europe appears at the forefront of plastic pollution. (Buchholz, 2019)

Fig. 2. Developed Nations Produce Most Plastic, Annual plastic production by region in 2017 (in kilogram per capita)



Source: “Statista”

The figure shows that regions like NAFTA, Europe, Japan, and China generated most of the plastic waste in 2017.

The data presented, reveal a strange phenomenon regarding the level of pollution from countries around the world. According to scientific explanations, “high-income countries typically have well-managed waste streams and therefore a low level of plastic pollution to external environments.” Why, then, do the countries from the EU, which are committed to more innovative and environmentally friendly products and create and develop sustainable development policies, are the main generators of plastic waste, as several studies show? Does the level of economic development have a real impact on plastic waste generation?

Methodology and results

To determine whether there is a connection between economic development and plastic waste generation within the European Union, the strength of the relationship between generated waste per capita and gross national income per capita is going to be evaluated. Calculations concern the 2004–2016 period.

The methodology is based on linear regression (“Panel Least Squares”), using panel data that combine two components – country fixed effects and period fixed effects. This is a type of statistical measurement “that attempts to determine the strength of the relationship between one dependent variable, in this case, this is the “*waste per capita*” and a series of other changing variables - known as independent variables”, (Investopedia, 2019) (in this case the “*gross national income per capita in USD*” for all counties of the European Union).

Linear Regression Analysis is the simplest form of a regression analysis that uses one dependent variable and one independent variable. In this simple model, a straight line approximates the relationship between the dependent and the independent variable. (Devault, 2019). The core idea is “to obtain a line that best fits the data”. (Swaminathan, 2018)

The following equation should be used for the calculation. To find out the dependent variable, namely plastic waste per person, one needs to multiply “beta” by gross income per capita for a respective country and add the constant, country fixed effect (which is the same for all years but different for each county) and period fixed effects (which is the same for all countries but different for each year).

$$WASTE_{CAP} = \beta * GNI_{CAP} + C + [CX = F, PER = F]$$

Where:

$WASTE_{CAP}$ – Plastic waste per capita;

GNI_{CAP} – Gross national income per capita;

β - The slope of the regression line (how much Y changes for each unit change in X);

$CX = F$ – Country effects fixed;

$PER = F$ – Period effects fixed;

C – Constant;

The constructed panel data set for all 28 EU member states cover the 2004-2016 period with a two-year interval. Analysis is conducted with bi-annual data for each country, retrieved from Eurostat (Eurostat, 2019) and World Bank Group (US). (World Bank Group, n.d.)

The table below shows the results after the calculations according to the formula given. (Table 1.)

Table 1. Panel Linear Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GNI_CAP	0.001758	0.000605	2.907010	0.0042
C	-25.88012	19.14305	-1.351933	0.1783
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.587895	Mean dependent var	29.66837	
Adjusted R-squared	0.500866	S.D. dependent var	22.79400	
S.E. of regression	16.10382	Akaike info criterion	8.556423	
Sum squared resid	41752.62	Schwarz criterion	9.141800	
Log likelihood	-803.5294	Hannan-Quinn criter.	8.793412	
F-statistic	6.755206	Durbin-Watson stat	1.773725	
Prob(F-statistic)	0.000000			

The results obtained show a statistically significant positive relationship between the two variables, i.e., GNI per capita and Generate Plastic Waste per person. At first glance, the relationship may seem very weak judging by the 0.001758 value. In this case, the value of beta shows how much the plastic waste per person is going to change if the unit of income changes in absolute terms. This means that, if income per person increases by \$1, the plastic waste generated per person is also going to increase, but by 1.7grams. If we assume that the total income for the study period increased by \$1000, this means that the amount of plastic waste generated per person increased by as much as 1.7 kilos, which is a high amount considering that this is only a fraction of the kinds of waste a human generates. If we take a county like Estonia as an example and trace how much income per capita changed during the 2004–2016 period, the result indicates an increase of \$16,490. This, in turn, means that the plastic waste generated per person increased by 28 kilos – an enormous waste quantity for only one person. From this calculation, it can be concluded that the ‘ β ’ parameter is statistically significant and the hypothesis is proven.

As seen in the table, (Table 1) the value of “R-squared” (the coefficient of determination, which shows the model’s capacity to describe real data) is approximate 59%. Therefore, the interpretation of the significance of the case study model created can be described as “strong”. The Adjusted R-squared value is 0.50, with approximately 8% difference from the R-squared. If we had more independent variables, this would have stronger significance for the case. Still, this value indicates a positive correlation.

Since the panel regression model is characterised by providing more detailed analysis, we can find different features related to plastic pollution in the EU countries observed. In the method used, country effects describe country-specific characteristics not covered or described by the model factors. Data from the table attached express deviations from average pollution values for the entire EU (Table 2).

Table 2. Country fixed effects

	EU_COUN...	Effect
1	Austria	5.066285
2	Belgium	40.12644
3	Bulgaria	14.40465
4	Croatia	6.973825
5	Cyprus	27.82610
6	Czechia	6.628902
7	Denmark	-35.52086
8	Estonia	27.25305
9	Finland	-25.09981
10	France	-15.50499
11	Germany	-20.85822
12	Greece	11.77326
13	Hungary	7.034015
14	Ireland	2.773225
15	Italy	4.628284
16	Latvia	1.857047
17	Lithuania	4.041823
18	Luxembourg	-39.40190
19	Malta	-13.68828
20	Netherlands	-24.61015
21	Poland	10.36280
22	Portugal	11.74573
23	Romania	15.70027
24	Slovakia	3.010258
25	Slovenia	1.502253
26	Spain	-1.407604
27	Sweden	-25.90544
28	United King...	-0.710962

It is seen that countries like Denmark, Finland, France, Germany, Luxembourg, Malta, the Netherlands, Spain, Sweden, and the United Kingdom present negative values, which means that pollution in these countries is less than the Union's average rate due to unexplained, but county-specific reasons. For example, Denmark presents 35kg less of plastic waste per person than the EU average.

The rest of the countries –Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Estonia, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, and Slovenia present positive values, which means that plastic pollution in these counties is higher than the Union's average rate, again due to unexplained, but county-specific reasons. For example, Belgium presents 40 kg more of plastic waste per person than the EU average.

Looking at the time effects table, we can see how plastic pollution has changed over the study period. It represents the total deviation for all countries over time relative to the average amount of waste per person. Time-fixed effects are general, not country-by-country, but they change over time. The results obtained allow us to observe a clear and stable reduction of waste per capita during the observed period. (Table 3)

Table 3. Time fixed effects

	DATEID	Effect
1	2004-01-01	11.66129
2	2006-01-01	11.13679
3	2008-01-01	0.711574
4	2010-01-01	0.219681
5	2012-01-01	-7.801961
6	2014-01-01	-5.711779
7	2016-01-01	-10.21559

For example, in 2004, there was around 11 kg more plastic waste per person than the average for all study periods. In 2016, there was 10 kg less than the average per all study period, which outlines a pronounced reduction in plastic pollution. This indicates that there generated waste is being reduced, which, in turn, helps reduce pollution.

Conclusion

Plastic is one of the most used materials in our daily lives. Plastic waste is indisputably one of the greatest pollutants on our planet. According to the figures, the European Union is one of the most plastic polluted areas in the world. To find out whether there is a relationship between population income and the level of plastic pollution, a linear regression ("Panel Least Squares"), using panel data that combine two components, namely country-fixed effects and period-fixed effects. Although data show that income has a positive impact on plastic waste generation, because of wide variations in income

over time, the figures obtained over the years of the study period show that there is a steady decline in the waste amount generated. This, in turn, may be due to changes in the way people think and live, as well as to the policies adopted by EU countries.

Grossman's statement claiming there is growing concern that the continued expansion of global economy will cause irreparable damage to earth's environment and exacerbate the quality of life for future generations is more than valid today. (Grossman, 1993) The truth is that we are so privileged to be living in times when we have access to so much information and resources to deal with such a serious problem. We are witnessing various innovative products that can substitute plastic, thus reducing our negative impact on the environment. To achieve this vital goal for us, we need to spread the idea and convince as many people as possible to comply with it. Only by realising the problem we can create a more sustainable economy, establish new rules, and adopt a new way of living in harmony with nature around us! We are the last generation who can make the difference before it is too late!

References

- Buchholz, K. (2019, 04 02). *Developed nations produced the most plastics*, Retrieved 08 2019, from Statista: <https://www.statista.com/chart/17564/annual-per-capita-production-of-plastic-by-region/>
- Devault, G. (2019, 02 17). *What Simple Linear Regression is and how it works*, Retrieved 08 2019, from The balance small business: <https://www.thebalancesmb.com/what-is-simple-linear-regression-2296697>
- Eurostat. (2019, 06 13). *Generation of waste by waste category, hazardousness and NACE Rev. 2, activity, Plastic waste*, Retrieved 08 2019, from Eurostat: <https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>
- Feldman, D. (2008). *Polymer History, Designed Monomers and Polymers*, doi:10.1163/156855508X292383
- Grossman, G. M. (1993). *Pollution and waste: what do we know?*, Retrieved 08 2019, from The Economics Of Sustainable Development: <https://epdf.pub/the-economics-of-sustainable-development.html>
- Investopedia. (2019, 08 05). *Regression description*, Retrieved 08 2019, from Investopedia: <https://www.investopedia.com/terms/r/regression.asp>
- Lebreton, L., & Andrady, A. (2019, 01 29). *Future scenarios of global plastic waste generation and disposal*, Retrieved 08 2019, from Palgrave communications, Humanities Social Sciences: <https://www.nature.com/articles/s41599-018-0212-7#Fig2>
- Ritchie, H., & Roser, M. (2018). *Plastic Pollution*, Retrieved 08 2019, from Our World in Data: <https://ourworldindata.org/plastic-pollution>
- Rocha-Santos, T., & C Duarte, A. (2015). *A critical overview of the analytical approaches to the occurrence, the fate and the behaviour of microplastics on the environment*, Retrieved 08 2019, from Science Direct: <https://www.sciencedirect.com/science/article/abs/pii/S0165993614002556?via%3Dihub>
- Rochman, C. M., Cook, A.-M., & Koelmans, A. A. (2016). *Plastic debris and policy: using current scientific understanding to invoke positive change*, doi:10.1002/etc.3408
- Science History Institute. (n.d.). *The History and Future of Plastic*, Retrieved 08 2019, from Science History Institute: <https://www.sciencehistory.org/the-history-and-future-of-plastics>
- Speth, J. G. (1988). *Environmental pollution: Along-term perspective*, Retrieved 08 2019, from http://pdf.wri.org/environmentalpollution_bw.pdf

- Swaminathan, S. (2018, 02 26). *Linear regression, Detailed view*, Retrieved 08 2019, from Towards Data Science: <https://towardsdatascience.com/linear-regression-detailed-view-ea73175f6e86>
- United Nations. (n.d.) *Sustainable development goals*, Retrieved 05 22, 2019, from <https://www.un.org/sustainabledevelopment/>
- World Bank Group. (n.d.) *GNI per capita, PPP (current international \$)*, Retrieved 08 2019, from World Bank Group: <https://data.worldbank.org/indicator/ny.gnp.pcap.pp.cd>

PUBLIC DEBT AND ECONOMIC GROWTH: A REVIEW OF CONTEMPORARY LITERATURE

NIKOLAOS FILIPPAKIS^a
THEODOROS V. STAMATOPOULOS^{b,*}

^aHellenic Mediterranean University, Heraklion, Crete, Greece

^bUniversity of West Attica, Athens, Greece

Abstract

This article reviews the most important contributions to literature on “public debt - economic growth” relationship. Most relevant studies are empirical. Some of them are based on causality tests, albeit with no clear conclusion as to what the causes and what the effects are. We also indicate important gaps, which have not been considered and these are either periods of economic crises or “secular stagnation” phenomena. We suggest that policy makers and investors should reconsider not only the so-called 90% “threshold hypothesis” but also the causality itself, because there is no necessary theoretical consensus so far.

JEL Classification: E60, H63, O43

Keywords: Public debt; economic growth; financial crises; causality; threshold hypothesis; secular stagnation.

Acknowledgements: The authors would like to thank the anonymous referees for their valuable comments that have been truly helpful and improved the accuracy of the arguments this paper invokes. We also owe a heartfelt thank you to our colleagues (especially Prof. G. Bitros, Prof. G. Noja, Prof. M. Cristea, and Prof. El. Thalassinos) at ICABE-2020 for their helpful comments on a previous version of the paper presented there. We would also like to thank Associate Prof. S. Arvanitis from the Hellenic Mediterranean University (HMU) and Prof. P. Pantelidis from the University of Piraeus, members of the PhD supervision committee of Mr. N. Filippakis, for their constant assistance in this effort, and finally the Dept. of Accounting and Finance of the HMU for its technical assistance (libraries, databanks, and other resources) for this Phd course. The usual disclaimer applies.

*Corresponding Author: **Theodoros V. STAMATOPOULOS**, University of West Attica, School of Management, Economic and Social Sciences, Dept. of Accounting and Finance, Ancient Olive Grove, 250 Thivon & P. Ralli Str., Egaleo GR12241, Athens, Attica, Hellas (Greece).
E-mail: stamth@uniwa.gr. ORCID iD <https://orcid.org/0000-0002-9710-0870>.

Introduction

The global financial crisis of 2007-2009 (GFC-2008) has revived the debate on the nexus between public debt (PD) and economic growth (EG). The large PD increase during the last decades and, particularly, after the GFC-2008 has brought about a more spirited discussion among academics and policy makers concerning the effect of government debt on the economy. The influential paper by Reinhart and Rogoff (RR, 2010, p.573) supporting that "*...whereas the link between growth and debt seems relatively weak at 'normal' debt levels, median growth rates for countries with public debt over roughly 90 percent of GDP are about one percent lower than otherwise; average (mean) growth rates are several percent lower*" established a new consensus for the PD-EG nexus. Negative interaction between debt and growth in a non-linear relationship over a specific limit of debt (the "threshold hypothesis") has been characterised by the first wave of literature as a "stylized fact". Some researchers (Panizza and Presbitero, 2014; Eberhardt and Presbitero, 2015; Gomez-Puig and Sosvilla-Rivero, 2015) identify serious technical challenges when validating the methodology. Among others, they revealed cross-country heterogeneity, parameter instability, and endogeneity problems. These problems have converted the "threshold hypothesis" from an examination of correlation to the identification of causality even in statistical terms (Granger causality) without economic grounds. Theoretical literature to date seems not to have supported any one-way conclusion in the debt-growth nexus.

In this article we review the most important contributions to the relationship between PD and EG. Specifically, we classify relevant studies into two categories, i.e., those with and those without causality tests in order to detect the relevant causal relationship. Papers of both categories seem to adopt some restrictions on the examination of correlation and causality. For example, RRs' (2010) highly stylised descriptive analysis neither refers to other factors of economic development nor examines the possibility of any causal relationship, whether unidirectional or bidirectional, across countries (Eberhardt and Presbitero, 2015). Furthermore, the attempt to identify bidirectional causality between debt and growth leads some researchers to adopt the standard linear, Granger-causality test overlooking the possibility of a non-linear nexus (De Vita *et al.*, 2018).

The main contribution of the methodological classification used in this paper is the identification of three important issues, which literature has not yet explicitly considered: First, unlike previous studies, the importance of financial crises is highlighted; this lowers economic activity causing high indebtedness in the public sector in its attempt to "save" the productive private sector. More often than not literature examines the interaction between (public) debt and (economic) growth but does not consider the harmful impact of financial distress on growth. Second, necessary attention is paid to long-term interest rates since it is an important channel through which the increase of public debt can influence growth. Most of the studies find that higher public debt related to higher sovereign risk premia leads to higher long-term

interest rates (Baum *et al.*, 2013). However, in economically advanced countries, high levels of sovereign debt are usually observed concurrently with low respective interest rates today. Third, emphasis is placed on the future economic framework that will form the bases for literature analysis of the nexus PD and EC. This could be a “secular stagnation” environment which will be consistent with a binding environment of zero-lower bound (ZLB), low economic activity and price inflation below the target. The paper is organised as follows. Section 2 describes the theoretical underpinnings; section 3 describes the methodology employed; and section 4 presents the classification of research topics and gaps detected. The discussion appears in section 5, while section 6 concludes the paper.

Theoretical Underpinnings

In previous years, the focal point of the debate of the effect of government debt on domestic output was to investigate how a large PD could become detrimental for EG, in the short or long run. There are three main theoretical approaches to this discussion.

The first one is based on the Keynesian theory, through the textbook IS-LM model, which implies the existence of a positive nexus between PD and EG. This view relies on the effectiveness of expansionary fiscal policy in increasing aggregate demand and output, income, employment and EG, particularly when the economy is around the liquidity trap (Ewaida, 2017). The argument is consistent with the “conventional view” that, in the short run, GDP is demand-driven and could become efficient as fiscal policy stimulates it, under the well-known conditionalities. In this case, moderate PD levels have a positive short-run impact on EG, such as improving “monetary policy, strengthened institutions, enhanced private savings, deepened financial intermediation, or smoothed distortionary taxation over time (Gómez-Puig and Sosvilla-Rivero, 2018, p. 211)”.

On the contrary, the position that an increase in PD always reduces long-run EG is the second strand of the literature, which refers to the neoclassical and the endogenous growth models. This theory is based on the crowding out effect, suggesting that PD crowds out private investments through the higher levels of interest rates it provokes (Modigliani, 1961; Diamond, 1965; Saint-Paul, 1992). Specifically, in the long run, decrease in public savings leads to a higher budget deficit, which is not entirely offset by an increase in private savings. As a result, national savings decrease, which also drives national investments to lower levels. This will have an adverse impact on the GDP leading to: “...smaller capital stock, higher interest rate, lower labor productivity and wages. Lower foreign investment (or higher foreign inflows), instead, will have a negative effect on foreign capital income and will thus lower the country’s future GNP. This negative effect of an increase in public debt on future GDP (or GNP) can be amplified by the presence of distortionary taxes (Panizza and Presbitero, 2013, p.177)”.

From an inter-temporal perspective, the traditional neoclassical approach pointed out that an increase in national debt (both internal and external) can be beneficial for contemporary generations, but places a burden on future ones causing a reduction in private stock of capital. Modigliani, (1961) and Diamond (1965) came to the same conclusion suggesting that external debt has detrimental effects on long run growth because of the taxes needed to finance interest payments.

During the 1990s, endogenous growth models tried to illustrate which way the long run growth could increase in without being exclusively based on exogenous or “residual” technological changes as Solow’s model supports (Tamborini and Tomaselli, 2020). Nevertheless, they reached the same conclusion that an increase in PD reduces growth rate and there is always a future generation that will be burdened by it (Saint-Paul, 1992).

The conventional view on the distinction between PD short-and long-term influences ignore the fact that prolonged recessions could reduce future potential output causing permanent loss of real output level (Cerra and Saxena, 2008). This means that running fiscal deficits-so as to increase PD-may have both short-and long-run positive impact on output. In the same vein, DeLong and Summers (2012) support that expansionary fiscal policy is efficient enough and probably self-financing in an economy that is under pressure with short-term nominal interest rates at their zero-lower bound. Furthermore, some of the literature argues that the role of hysteresis is truly determining, and it should be seriously considered so that potential output remains constant. This is contrary to the notion of many economists that output remains invariable even after wide and extended recessions. According to DeLong and Summers (2012), and Fatas and Summers (2018), the attempt of many countries to implement fiscal consolidation to reduce PD generates a strong hysteresis effect leading to a higher debt-to-GDP ratio through their long-term negative impact on output.

Finally, the third theoretical aspect in the PD-EG nexus is related to the Ricardian equivalence theorem. The basic assumption here suggests that PD-EG interaction is neutral because the level of government debt generated is repaid through future taxes. In this context, a rational individual would be more eager to save at present by purchasing government debt securities and diminishing consumption to be able to pay future taxes. Reduction in public savings is expected to be fully offset by a corresponding reduction in the private sector. Consequently, the aggregate demand will remain unchanged whether the government chooses to increase taxes today or in the future. Thus, the debt burden on growth is neutralised, since interest rates and private consumption are not expected to be modified (Jurgen, 2019).

However, the major concern of literature, as reviewed, is that there is no integrated theoretical framework yet for the relationship between PD and EG. Despite the wide variety of (mainly empirical) explanations and insights on the debt-growth nexus, no unified theoretical proposal has been reached yet (Tamborini and Tomaselli, 2020).

Methodology

Table 1 presents in summary the identity, methodology and main findings of selective relevant literature papers. Furthermore, studies are distinguished into those with and those without causality tests so as to detect the relevant nature of the relationship.

Table 1. Selective studies on the relationship between public debt and economic growth. Studies with explicit causality tests.

A. Studies with causality tests.

Ref./ Author/Year	Countries / Sample period	Methodology	Main Conclusions	Causalities
1. Jacobs <i>et al.</i> (2020)	27 EU and 4 OECD countries / 1995-2013	Tri-variate PVAR model with Granger causality tests.	They find <i>negative</i> Granger causal ($\vec{}$) link from economic growth (EG) to public debt (PD) but not vice versa, irrespective of the level of debt. There is positive correlation between debt ratio (Dr) and long-term real interest rate (LTRIR). $EG \vec{} PD; \text{Corr.}(Dr, LTRIR) > 0$	A
2. Pegkas <i>et al.</i> (2020)	12 Eurozone Countries / 1995-2016.	Panel Cointegration analysis and Granger causality tests.	There is bi-directional causality (\leftrightarrow) between PD and EG. Negative long-run effect of PD on EG. The GFC-2008 has substantial negative effect on EG. $EG \leftrightarrow PD; EG = f(\overline{PD}, \overline{DumGFC'08})$	C
3. Lim (2019)	41 Advanced & Emerging eco. / 1952Q1 – 2016Q3	m-variate homogeneous panel VAR with Granger causality tests.	He finds that <i>total</i> (private + public) debt (<i>TD</i>) impulses generate a small but negative growth effect. The decomposition of TD indicates that, on average, PD expansions are responsible for EG contractions. For the Euro Area sub-sample, he presents evidence for a toxic bank-sovereign doom loop, while the effects of capital flows (CF) appear to be more persistent, especially after the GFC-2008, in mitigating the debt effect. $TD \vec{} EG; PD \vec{} EG$	B
4. De Vita <i>et al.</i> (2018)	11 Eurozone countries, US, UK, and Japan / 1970-2014.	Time series; standard linear Granger causality tests; VAR model.	No robust evidence of long run bi-directional causality (\leftrightarrow) between PD and EG. Heterogeneous results between countries mainly occurred due to differences in PD structure and composition. $EG \overset{?}{\leftrightarrow} PD; \text{heterogeneity among countries}$	D
5. Gomez-Puig and Sosvilla-Rivero (2017)	11 EMU countries / 1961-2015.	Neoclassical growth model of Solow, with Granger-causality tests and yearly time series.	PD increase induces harmful effect on EG before the official fiscal limit of European Stability and Growth Pact. The negative Granger causality of $\Delta(PD)$ on EG, as regards the Dr threshold and intensity, is not the same in all Eurozone (EZ) countries. $PD \vec{} EG; \text{threshold} < 0.9$	B
6. Bell <i>et al.</i> (2015)	Reinhart and Rogoff's (2010) data made available by Herndon <i>et al.</i> (2014) / 1900-2009; 1946-2009.	Multi-level causality modelling method.	The relationship between PD and GDP across countries has been found unstable. The negative relationship between PD and EG derives from the effect of the EG on PD, rather than the opposite. There are important differences in the overall trend of countries' EG over time. $EG \vec{} PD; \text{heterog. in countries' EG}$	A

7. Gomez-Puig and Sosvilla-Rivero (2015)	11 EMU countries / 1980-2013.	Granger- causality approach and endogenous breakpoint tests.	They find negative Granger – causality ($\bar{\rightarrow}$) between changes in PD [$\Delta(PD)$] and EG in some of the countries studied between the break date and the end of the sample period in 2013. EMU ¹ countries present heterogeneous relations between PD and EG and vice versa. $\Delta(PD) \bar{\rightarrow} EG$; heterogeneity in (PD-EG) EMU members	B
8. Puente-Ajovin and Sanso- Navarro (2015)	16 OECD countries /1980-2009.	Panel Granger causality tests.	They do not find any causal effect of PD on EG ($\overset{NO}{\rightarrow}$). Possibly it is low EG that leads to high levels of PD. They find evidence of a causal effect of private non-financial debt (PriNFD) on EG. $PD \overset{NO}{\rightarrow} EG$; $PD = f(\bar{EG})$; $PriNFD \bar{\rightarrow} EG$	A-

B. Studies with no causality tests.

Ref./ Author/ Year	Countries / Sample period	Methodology	Main Conclusions	PD-EG relations
9. Swamy (2020)	252 countries / 1960-2009.	Extended Solow growth model with PVAR.	There is a <i>negative</i> long-term effect of PD on EG, which is not the same for all countries and mainly depends on debt regimes and other important macroeconomic variables. $EG = f(\bar{PD})$	B-
10. Karadam (2018)	134 countries (23 adv. + 113 developing eco.) / 1970-2012	Panel Smooth Transition Regression (PSTR) model.	He finds that the nonlinearity of the relationship depends on the structure of PD. The level of the threshold, which is lower for developing countries, depends on the degree of economic development, of indebtedness and of the time horizon of PD. The threshold (DrT) depends on country development level. $EG_{it} = f\left(\overset{\pm}{PD}_{it}\right), i = \text{country}, t = \text{time},$ $DrT = \begin{cases} 106\% \text{ for } \textit{Advanced eco.} \\ 88\% \text{ for } \textit{developing eco.} \end{cases}$	B-
11. Eberhardt and Presbitero (2015)	118 developing, emerging and advanced economy countries/ 1960-2012.	Linear & non- linear novel specif. & diagn. based on log- linearised Cobb- Douglas function augm. with a PD stock term.	They find little evidence for a negative relationship between PD and long-run EG. Due to heterogeneity of specific characteristics across countries, the authors do not support the existence of a common debt threshold. $EG = f(\bar{PD})$; non-uniform threshold.	B-
12. Afonso, and Jalles (2013)	155 adv. + developing countries / 1970-2008.	Growth equations and growth accounting techniques.	There is a negative effect of PD on EG. For OECD countries, the longer the average debt maturity the higher the EG. Fiscal consolidation promotes EG in a non-Keynesian fashion. For countries with $Dr > 90\%$ ($<30\%$), the EG impact of 10% increase in the Dr is -0.2% (0.1%). An endogenous DrT of 59% may be derived. $EG = f(\bar{PD})$; 59% DrT.	B-

1. European Economic and Monetary Union (EMU)

13. Baum <i>et. al.</i> (2013)	12 EMU countries / 1990-2010.	Dynamic non-linear threshold panel data model.	The short run impact of PD on EG is positive (+) when $Dr \cong 67\%$, while it turns negative (-) for $Dr > 95\%$. Long-term interest rate (LTIR) increases when $Dr > 70\%$. $EG = f(Dr)$, $f=concave$; $threshold=(0.95)$; $Dr>0.7 \Rightarrow \uparrow LTIR$	B-
14. Kourtellos, Stengos & Tan (2013)	82 countries / 1980-2009. Three 10-y. growth periods.	Structural threshold regression (STR) using an augmented Solow growth model.	When a country's Democratic institutions (INST) are below a particular quality level, then, higher PD leads to lower EG (all else being equal). However, if a country's INST are of sufficiently high quality, then PD is growth-neutral. Long run effects of PD on EG. $INST = \begin{cases} Low\ Quality: EG = f(\overline{PD}) \\ High\ Qual.: \uparrow PD \rightarrow neutral\ on\ EG \end{cases}$	B-, C
15. Checherita-Westphal and Rother (2012)	12 Eurozone countries / 1970-2011.	Panel FE models corrected for heteroskedasticity and autocorrelation.	Significant non-linear relationship between PD and EG. When PD is $> 90\%$ of GDP, on average, it is detrimental for EG. $EG = f(Dr)$, $f=concave$; $threshold \cong (0.9-1.0)$	B-
16. Cecchetti, Mohanty & Zampolli (2011)	18 OECD countries / 1980 – 2010	Standard growth (EG) regressions, augmented with information about PD levels.	For countries with $Dr > 85\%$, PD is detrimental for EG. High levels of debt create volatility and have a negative impact on EG. $EG = f(\overline{PD})$; $85\% DrT$	B-
17. Kumar and Woo (2010)	38 advanced and developed economies / 1970-2007.	Panel models in a Cobb-Douglas production function.	There is an inverse relationship between initial PD and subsequent EG. On average, 10% increase in the initial Dr is correlated with slowdown in annual real per capita EG (rpcEG) of around 0.2% per year. $EG = f(\overline{init. PD})$; $\uparrow 0.1Dr \Rightarrow \downarrow 0.002rpcEG$	B-
18. Reinhart and Rogoff (2010)	20 advanced and 24 emerging countries / 1900-2009 1946-2009.	Descriptive empirical approach using a multi-country historical dataset.	When $Dr > 90\%$ of GDP, then EG drops to -0.1%. $Dr>0.9 \Rightarrow \downarrow 0.001EG$	B-

Notes: Last column refers to the second criterion for classifying studies (Granger causality or effects). The symbols there stand for: A = negative Granger-causality from EG to PD; A- = negative effect of EG on PD; B = negative Granger-causality from PD to EG; B- = negative effect of PD on EG; C = bi-directional Granger-causality between EG and PD; D = No-robust evidence of Granger-causality between EG and PD; EG = economic growth; PD = public debt; Dr = debt ratio; DrT debt ratio threshold; DM (EM) = developed (emerging) market economies; n. -eff. = neutral effects; INST = Democratic institutions.

Classification of Research Topics and Detection of Gaps

In Table 1 we classify the studies selected from the literature on the “public debt (PD) - economic growth (EG)” relationship in two categories, according to causality tests performed.

In the first category there are studies that used the causality methodology (Table 1, part A). Puente-Ajovin and Sanso-Navarro (2015) examined 16 countries of the Organization for Economic Co-operation and Development (OECD), using panel-Granger causality tests, and they did not find a causal effect of government debt on GDP. Probably it is the low EG that leads to high levels of debt. Bell *et al.* (2015) used a multi-level modelling method with RR's data and concluded that there is variation between PD and EG. The negative nexus between debt and growth derives from the effect of growth on debt rather than the other way around. Gomez-Puig and Sosvilla-Rivero (2015), in a Granger-causality approach for eleven European Economic and Monetary Union (EMU) countries, confirm, a negative causality for some of these due to changes in sovereign debt to EG ratio. EMU economies present heterogeneous relations among relevant variables. De Vita *et al.* (2018) conducted Granger causality tests and VAR models for eleven EMU economies along with the US, the UK, and Japan, and found no robust evidence of long run bi-directional causality between debt and growth. In the same way, Gomez-Puig and Sosvilla-Rivero (2015) demonstrated heterogeneous results between countries due to differences in the structure and composition of their debt. In addition, Pegkas *et al.* (2020) analysed twelve Eurozone economies and provided evidence for a bi-directional causality between PD and EG. Among others, these authors emphasised the magnitude of the financial crisis in 2008 as a cause for the negative effect of PD on GDP. Gomez-Puig and Sosvilla-Rivero (2017) attributed the harmful effect of increasing debt to economic activity before the official fiscal limit of European Stability and Growth Pact (ESGP). Adopting time series on yearly data in the neoclassical growth model of Solow, for a sample of eleven EMU countries has shown the negative Granger-causality of changes in debt on growth for some of them. The debt threshold is not the same for all Eurozone economies. However, Jacobs *et al.* (2020) examined a tri-variate panel VAR-model (PVAR) in a sample of 27- European Union (EU) and four OECD countries detecting a causal link from EG to PD but not vice versa, irrespective of the level of debt. The authors also confirmed that there was positive correlation between the debt ratio and long-term real interest rates.

In the second part of Table 1 we classified studies that have not used causality tests in researching the EG-PD relationship. Even after ten years, the seminal work of RR still influences a broad strand of the literature concerning the PD-EG relationship. Based on a multi-country historical dataset, through a descriptive approach, it was found that “...median growth rates for countries with public debt over roughly 90 percent of GDP are about one percent lower than otherwise; (RR, 2010, P.573)”. Herndon *et*

al. (2014) strongly criticised RRs' research and identified three problems: first, their selective data exclusions, second, their coding errors, and, finally, their inappropriate weighing methodology. After their recalculation of RRs' data, Herndon *et al.* (2014) found that when the public debt/GDP ratio is higher than 90%, the growth that is revealed is, actually, positive, i.e., 2.2%, rather than negative, i.e., -0.1%. Despite such criticism and the serious technical challenges of the validity of RRs' methodology, the establishment of a 90% threshold as a "stylized fact" appears to offer strong support for implementing austerity policies on both sides of the Atlantic (Europe and the United States). Some researchers, such as Herndon *et al.* (2014), Dafermos (2015), Eggert (2015a), Eggert (2015b) and Amann and Middleditch (2020) have replicated (corrected and recalculated) the methodology and data of RRs' with the intention of revising RRs' postulation.

Some of the studies presented in Table 1 have analysed the "debt threshold hypothesis", detecting a negative interaction between PD and EG and concluded on a non-linear relationship when exceeding a specific limit of debt. Checherita-Westphal and Rother (2012), using a panel model of fixed-effects for twelve Euro-area countries, claim there is a significant, non-linear relationship between government debt and GDP growth. Exceeding the 90%-100% of the GDP threshold, PD is, on average, detrimental for economic activity. In the same context, Baum *et al.* (2013), using a dynamic non-linear threshold panel model for the same twelve Eurozone countries, argued that the short run impact of debt on GDP growth is positive when the ratio of public debt to GDP is around 67%. For higher debt ratios, above 95%, the influence of an additional debt has a detrimental effect on EG. From an empirical point of view, it is claimed that the emergence of cross-country heterogeneity and parameter instability over time have led the consensus of debt-threshold hypothesis to be reverted (Amann and Middleditch, 2020). Panizza and Presbitero (2014) stressed that the crucial point is the appearance of endogeneity problems in econometric modelling, which affect the "true" link between debt and growth. A Vector Autoregressive (VAR) model is a typical non-theoretical time-series method to treat endogeneity and analyse the dynamic interactions between the variables studied (Jacobs *et al.*, 2020). The result of a high level of sovereign debt could originate from low economic activity that determines the interaction between PD and EG.

Kumar and Woo (2010), examining a sample of 38 advanced and developing economies adopted panel models in a Cobb-Douglas production function and demonstrated the existence of an inverse relationship between initial debt and subsequent growth. These authors proved that an average of 10% increase in the initial debt to GDP ratio was linked to a slowdown in real per capita GDP growth of around 0.2% per year. Eberhardt and Presbitero (2015) employed novel linear and non-linear specifications and diagnostics, from the time-series literature adapted for use in the panel, based on a log-linear Cobb-Douglas production function augmented with a debt stock term.

Studying 118 countries, these authors presented little evidence for a negative relationship between PD and long-run growth. Due to the heterogeneity of specific characteristics across countries, Eberhardt and Presbitero (2015) did not support the existence of a common debt threshold. Swamy (2020) estimated the debt–growth interaction using an extended Solow growth model with PVAR in a sample of 252 countries. He found a negative effect of PD on EG, which is not the same for all countries, and is mainly depended on debt regimes and other important macroeconomic variables.

However, all studies, whatever their methodology, appear to have some limitations. As Bell *et al.* (2015) observed, “...empirically, both the presence and shape of any relationship is dependent on the specification of the model and the statistical method being used.” The PD-EG relationship seems to be no exception.

To date, RRs’ paper has been the most influential yet controversial study in relevant literature. In their effort to establish a clear conclusion with strong policy influence, they, however, failed to exploit the potential of their data. They simplified their conclusion about the “debt-threshold hypothesis” without examining the possibility that the frame is dependent on each country individually. The authors’ purpose was “to build the case for a stylised fact” (Bell *et al.*, 2015), but their highly stylised descriptive analysis does not refer to other determinantal factors of economic development, nor does it examine the possibility of any causal relationship, either unidirectional or bidirectional, across countries (Eberhardt and Presbitero, 2015). Beyond this context, the work of RRs’ presents many statistical and methodological limitations. The authors do not use a formal statistical framework and their panel is unbalanced. However, for explication purposes, they take into consideration that the panel is balanced and use strong assumptions about the homogeneity between countries, thus implying that different countries converge to a same rate of equilibrium, without considering the consequences of debt overhang from one country to another (Chudik *et al.*, 2015). There are some reasons to believe that equilibrium in the relationship of PD to EG is not the same across countries. First, production technology according to the “new growth” theory differs from country to country; second, the ability to accept high levels of debt is determined by a number of country-specific characteristics; and, third susceptibility to PD is not only subject to debt levels but also to debt composition (Eberhardt and Presbitero, 2015). RRs’ weighted methodology seems to be arbitrary and unfounded regarding the way means and medians were generated. “The impact of RRs’ approach is to greatly amplify the effects of short-term episodes with high public debt levels in calculating the overall impact of high public debt on GDP growth (Herndon *et al.*, 2014).” Methodologically, the studies of this era, apart from examining non-linearities and detecting a common debt threshold, do not take into consideration that the effect of debt accumulation on EG is determined by the time horizon within which this relationship is analysed (Gomez-Puig and Sosvilla-Rivero, 2018). Generally speaking, the work of RR appears to have certain common methodological characteristics with some other studies of the first surge of literature papers, such as

those of Checherita and Rother (2012) and Baum *et al.* (2013). The main common characteristic of these studies is that they “...use econometric models that are limited to either explain the short- or long-term impacts of debt on growth and not both (Juergen, 2019, p. 7).”

Besides the limitations of the first literature stream, the second one also displays some constraints regardless of the specific methodological approach that it follows. The shift from correlation to causality leads research to using the Granger causality test. However, the effort to identify bidirectional causality between debt and growth leads some studies into adopting the standard linear Granger causality test, overlooking the possibility of a nonlinear nexus. This method is defective because the typical Granger causality method has little power in identifying nonlinear causal relationships (De Vita *et al.*, 2018). In addition, when the causal relation is being estimated (between debt and growth nexus) it is crucial to consider the existence of cross-country dependence and heterogeneity (Puente-Ajovin and Sanso-Navarro, 2015). An important restriction emerging when this relationship is analysed is that “over time, growth is highly erratic compared to debt which changes much more slowly. This means that when using debt to explain growth, we will only be able to account for a small proportion of the variance of growth (Bell *et al.*, 2015).”

Furthermore, some studies present limitations in Cobb–Douglas production function regarding the returns to scale of the factors (Gomez-Puig and Sosvilla-Rivero, 2018). Other papers based their methodological framework on an extended Cobb–Douglas function using only the PD next to the capital variable. Exempting private debt is decisive since private debt is one of the main factors entailed in financial instability and economic crises.

Another important limitation the literature does not consider when measuring debt is “...that a high proportion of foreign currency denominated debt could increase financial fragility and lead to sub-optimal macroeconomic policies (Eberhardt and Presbitero, 2015).” The sample period and the model play an essential role in methodology, while a primary concern is to preserve some homogeneity. Despite the efforts of some studies to achieve this goal, there were too many restrictions in their dataset. Swamy (2020) argues that his work is unique in addressing, *inter alia*, matters of data adequacy and country coverage. He presents new empirical evidence based on a sizeable dataset that includes 252 countries. Nevertheless, in our point of view, it is quite doubtful if this large sample can be homogeneous. In accordance with the recent trend that examines the causality in PD–EG interaction, it is admitted, along with the authors supporting this view, that low economic activity could be the reason for high indebtedness.

The discussion on literature methodology presented above reveals some possible research gaps. First, it is noted that there is no systematic analysis of the impact of GDP on PD as a result of the global financial crisis of 2008 (GFC-2008). With the exception of some studies claiming that financial crises negatively affect growth path

(see Checherita-Westphal and Rother, 2012; Gomez-Puig and Sosvilla-Rivero, 2015; Juergen, 2019; Lim, 2019; Amann and Middleditch, 2020; Pegkas *et al.*, 2020), the majority of literature does not examine this prospect. Even a few studies that identify the role of financial crises, and specifically the GFC-2008, as a driver of high indebtedness, encounter two main problems. On the one hand, their sample period is limited to that around the onset of the crisis, or, at best, they examine a few of the years following it, which means not estimating the overall consequences of the turmoil; on the other hand, their approximation is somewhat superficial, without reaching deeper into the matter. This research gap is apparent in the case of the Eurozone sovereign debt crisis in 2010, as an aftermath of the impact of GFC-2008. Most EMU countries presented low EG and high PD after 2008. Especially countries of the periphery (Greece, Italy, Spain, Portugal, and Ireland) came up against serious macroeconomic imbalances, which, in some cases (Greece), were extreme.

Second, the high level of debt has a negative effect on capital stock and economic growth. According to the 'conventional' view "*the issuance of government debt stimulates aggregate demand and economic growth in the short run but crowds out private capital and reduces national income in the long run* (Elmendorf and Mankiw, 1999)". The long term-interest rates could be an important channel through which the increase of PD can influence growth. *Higher public debt is likely to be associated by investors with higher sovereign risk premia, which could be translated into higher long-term interest rates. In turn, this may lead to an increase in private interest rates and a decrease in private spending growth, both by households and firms, which are likely to dampen output growth* (Baum *et al.*, 2013).

Regarding this point of view, we remark that in the last decade, although PD is at high levels in advanced countries, the long-term interest rates remain low, obviously due to huge Central Banks' intervention creating excess liquidity in capital markets. If we consider the example of the Eurozone, the literature that examines the interaction of PD and economic activity has not sufficiently answered why the long-term interest rates after 2013 have remained at low levels and the debt of many of these economies is so high.

Third, it has to be emphasized that the current macroeconomic ill of "secular stagnation", that is, chronic ZLB, anaemic growth, and price inflation below target, cannot be ignored in pertinent research. These three factors should not be absent from the research on causalities of the PD-EC relationship. Recent "secular stagnation" state in most of the OECD countries should be perceived as a permanent effect of financial crises and ineffectiveness of formal economic policy.

Discussion

Our purpose in this survey is to illustrate selective literature papers concerning the relationship between PD and EG. RRs' work has managed to establish a highly "stylised fact", while preventing the identification of relevant causality. However, concerning the latter, it has driven recent papers to move away from correlation. Krugman (2013) pointed out the importance of RRs' research as the "*...more immediate influence on public debate than any previous paper in the history of economics*". The establishment of a 90% threshold as a "stylised fact" appears to offer strong support for implementing austerity policies on both sides of the Atlantic, namely, Europe and the United States. Nevertheless, the results of these policies were devastating in terms of, at least, unemployment and per capita income, especially for many economies in the periphery of the Eurozone (Herndon *et al.*, 2014; Romer and Romer, 2018; Amann and Middleditch, 2020).

The classification of the studies presented above reveals some strong and weak points regarding their techniques. On the one hand, as Panizza and Presbitero (2014) demonstrate, the importance of PD dynamics and history of a specific economy related to the structure of this debt could together play a crucial role when examining this correlation. On the other hand, when we investigate causation, in some cases, the Granger-type causality test focuses exclusively on a bivariate relationship, thus providing only partial equilibrium results. It does not take into consideration the influence of other macroeconomic and institutional variables that could endogenously affect both debt levels and EG (De Vita *et al.*, 2018).

Our methodology illustrates some research gaps in the relationship examined. Many studies support that the decrease of EG is the cause for the increase in sovereign debt. We emphasise the importance of economic and financial crises for lowering economic activity. It is obvious that financial crises are one of the main influential factors for real national income, as has been proven in the case of the GFC-2008. Romer and Romer (2017) found that in the aftermath of financial crises, the real GDP plunged with asymmetric variability; not only was it statistically significant but persistent too, although moderate in magnitude.

Therefore, the 2008 global economic and financial collapse should be clearly considered not only a period of significant financial turmoil but also one of a highly correlated distress call. Proano *et al.* (2014) confirm that financial crises are a decisive factor of non-linearity between debt and GDP. High levels of financial distress (such as the GFC-2008) negatively affect EG, irrespective of PD level. In the same context, Reinhart and Rogoff (2009) argue that the recessions caused by financial crises end at some point in time, but are usually accompanied by huge increases in government debt. This implies a protracted contraction of national output.

Focusing, now, on the EMU, relevant literature identifies the interaction of the level of debt and the level of financial distress and provides evidence that high debt reduces the level of economic activity during periods of financial turbulence. This is demonstrated particularly in peripheral countries of the “union” rather than in stand-alone economies (Proano *et al.*, 2014). From a macroeconomic point of view, output decline in the aftermath of a financial crisis is much more harmful for monetary union member-countries, since they do not have control over the currency in which their debt is issued, while their fiscal policy is monitored by supranational authorities, as opposed to a stand-alone country that usually has both its own control and monitoring (De Grauwe, 2011). In addition, the financial turmoil itself entails characteristics of exogenous variation and induces reduction of GDP (Romer and Romer, 2018).

Consequently, literature finds that higher PD, linked to higher sovereign risk premia, leads to higher long-term interest rates through a non-linear relationship. Ardagna *et al.* (2007), using a panel VAR estimation, argue that when the debt ratio exceeds 65%, debt has a positive effect on these interest rates. Baum *et al.* (2013), considering two time periods, namely, 1990-2007 and 1990-2010, show that a threshold value over 76.3% of the GDP, induces PD interest rates to rise. Jacobs *et al.* (2020), using a panel VAR model, also found that, for over-indebted countries, increase in long-term real interest rates has a negative impact on economic activity, causing further increase in PD, thus producing a vicious circle.

All these studies appear to have a common characteristic: their sample horizon is, at its best, until the year 2013. This means that they do not consider the fact that after the year 2009 for the United States and 2013 for the Eurozone, the new reality is ZLB economic environment, which includes zero or negative real interest rates. In their work, Jacobs *et al.* (2020) raise a question for future research: “...*why the long-term interest rate in one country stays at quite a low level in spite of large public debt, while it sharply rises in another country under the same circumstances?*”. This is their way of making a reference to Greece and Japan. The question could have already been answered since both these strongly heterogeneous countries appear with an anemic EG, negative real interest rates, and high levels of PD.

Future research on the PD-EG relationship must consider the new environment of “secular stagnation”, that is, all three components of chronic binding ZLB, low growth rates, and price inflation below target (Eggertsson *et al.*, 2019). It should also be proposed that inflation of stock prices be added, as a result of excess liquidity, or cheap money offered by central banks. On the one hand, “Japanification” or a long-term liquidity trap implies that low interest rates are expected to last for several years; on the other, negative rates, such as those of the Eurozone, or slightly raised policy rates, such as those of the United States, produce reasonable expectations for ineffective monetary policy (Blanchard and Summers, 2020). Contrary to macroprudential policy, and ten years after RRs’ work, some researchers (Eggertsson *et al.*, 2019) (although not arguing for higher PD), find evidence that increasing government

debt is an efficient approach to avoid secular stagnation. However, contrary to the traditional view, some others (Blanchard, 2019) support the view that increasing debt does not entail any fiscal cost or welfare loss. Examining the magnitude of interest rates in a welfare framework through intergenerational transfers, the important role of both the average safe rate and the average (risky) marginal product of capital can be observed. The crucial question is whether the safe interest rates will remain below the level of growth rates. If this happens, a “new normality” is going to be created, which means that this situation will likely be more the historical norm, than the exception.

If this “new normality” becomes true, we will probably face the challenge to re-evaluate the perspective of the improvement of debt sustainability through expansionary fiscal policy. Thus, as Furman and Summers, (2020) propose, “...it is more appropriate to compare debt stocks to the present value of GDP or interest rate flows with GDP flows”. As a result, the increase of output is more than the rise in debt and interest payments, thus reducing the debt-to-GDP ratio. Productive public investments with remarkably high rates of return could be an approach to increase an economy’s potential output. Public spending in research, infrastructure, and education is very possible in order to have utility “...far greater than the costs of any additional debt accumulation...” repay these investments in present value terms (Furman and Summers, 2020). Blanchard (2019) claims that in a secular stagnation environment, “...a number of arguments against high public debt, and in particular the existence of multiple equilibria where investors believe debt to be risky and, by requiring a risk premium, increase the fiscal burden and make debt effectively riskier. This is a very relevant argument, but it does not have straightforward implications for the appropriate level of debt.”

This paper includes, among others, the impact of increasing PD on interest rates and growth, which seems to be the core of future debate on the PD-EG nexus, providing a fruitful discussion on costs of debt and relevant policy.

Conclusions

The continuing debate on the PD-EG nexus proves that it is a more complex issue than that of the descriptive view of Reinhart and Rogoff (2010) in their seminal paper. Empirical evidence of relevant literature should be taken into account with caution, since, as has been shown through this paper, there is no pertinent comprehensive economic theory yet.

This article surveys the most important contributions in the literature that examine the interaction between PD and EG. We have classified studies into two main categories according to whether they use causality tests or not. In the survey done no clear support was found in favour of the position that PD (or EG) is the cause or the result. In the first category of the sample of studies surveyed, approximately half of those with causality tests proved that EG is the cause and PD is the effect in their

relationship. However, one should not forget that causality tests show the relation of the underlying statistical properties of the data used, not the underlying economic reasoning. The same approximate conclusion can be reached when considering the second half of Table 1, even though, most studies seem to have found PD as statistically significant in explaining the variability of EG. However, these identified models present no explicit theoretical foundation that has actually been tried to sketch through empirical methodology.

In addition, the negative interaction on a non-linear relationship over a specific PD limit, the so-called “threshold hypothesis”, has been characterised as a “stylised fact”. However, cross-country heterogeneity, parameter instability, and endogeneity problems converted this hypothesis from examining correlation to identifying causality, as mentioned above.

In this context, the methodology of this study has offered the opportunity to indicate three important issues relevant literature has not yet taken into account. First, no systematic analysis on the impact of GDP growth on PD has been found as a result of financial distress, such as the global economic and financial crisis of 2008. This is clear in the case of the Eurozone, where many countries have presented low EG and high PD after 2008. Second, although relevant literature argues that higher PD is correlated with higher sovereign risk premia, which, in turn, leads to higher long-term interest rates, one could observe that in the last decade, advanced economy countries present low levels of both long-term interest rates and EG. Furthermore, the literature surveyed did not take into consideration that, after 2009 for the United States and 2013 for the Euro area, the new reality has been a ZLB economic environment. Third, it is highlighted that further research in the PD-EG nexus must be examined under “secular stagnation” conditions, which have not yet been studied; these are characterised by restrictive ZLB, low EG rates and price inflation that falls below target.

It is remarkable that contrary to macro-prudential policy, some researchers support the view that increasing government debt is a natural approach to avoid secular stagnation. In any case, whether this argument becomes the “new normality” or not, it certainly offers food for future debate.

References

- Afonso, A. & Jalles, J. T., 2013, “Growth and Productivity: The Role of Government Debt”, *International Review of Economics & Finance*, 25, 384–407.
- Amann, J. & Middleditch, P., 2020, “Revisiting Reinhart and Rogoff After the Crisis: A Time Series Perspective”, *Cambridge Journal of Economics*, 44(2), 343-370.
- Ardagna, S., Caselli, F. & Lane, T., 2007, “Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries”, *The B.E. Journal of Macroeconomics* 7(1), 1-35.
- Baum, A., Checherita-Westphal, C. & Rother, P., 2013, “Debt and Growth: New Evidence for the Euro Area”, *Journal of International Money and Finance*, 32, 809-821.
- Bell, A., Johnston, R. & Jones, K., 2015, “Stylised Fact or Situated Messiness? The Diverse Effects of Increasing Debt on National Economic Growth”, *Journal of Economic Geography*, 15(2), 449-472.

- Blanchard, O. J. & Summers, L. H., 2020, "Automatic Stabilizers in a Low-Rate Environment", *American Economic Review: Papers and Proceedings*, 110, 125–130.
- Blanchard, O., 2019, "Public Debt and Low Interest Rates", *American Economic Review*, 109(4), 1197–1229.
- Cecchetti, S. G., Mohanty, M. S. & Zampolli, F., 2011, "The Real Effects of Debt", BIS Working Papers No 352, September. Published in: *Economic Symposium Conference Proceedings*, Jackson Hole, 145-96.
- Cerra, V. & Saxena, S. C., 2008, "Growth Dynamics: The Myth of Economic Recovery", *American Economic Review*, 98(1), 439-57.
- Checherita-Westphal, C. & Rother, P., 2012, "The Impact of High Government Debt on Economic Growth and its Channels: An Empirical Investigation for the Euro Area", *European Economic Review*, 56(7), 1392-1405.
- Chudik, A., Mohaddes, K., Pesaran, H. M. & Raissi, M., 2017, "Is There a Debt-Threshold Effect on Output Growth?", *The Review of Economics and Statistics*, 99(1), 135-150.
- Dafermos, Y., 2015, "The 'Other Half' of the Public Debt–Economic Growth Relationship: A Note on Reinhart and Rogoff". *European Journal of Economics and Economic Policies: Intervention*, 12(1), 20-28.
- De Grauwe, P., 2011, "The Governance of a Fragile Eurozone", CEPS Working Document, No. 346, May.
- DeLong, B. J. & Summers, L. H., 2012, "Fiscal Policy in a Depressed Economy", *Brookings Paper on Economic Activity*, 43(1), 233–297.
- De Vita, G., Trachanas, E. & Luo, Y., 2018, "Revisiting the Bi-Directional Causality Between Debt and Growth: Evidence from Linear and Nonlinear Tests", *Journal of International Money and Finance*, 83, 55-74.
- Diamond, P. A., 1965, "National Debt in a Neoclassical Growth Model", *American Economic Review*, 55(5), 1126-1150.
- Eberhardt, M. & Presbitero, A.F., 2015, "Public Debt and Growth: Heterogeneity and Non-Linearity", *Journal of International Economics*, 97(1), 45-58.
- Égert, B., 2015a, "Public Debt, Economic Growth and Nonlinear Effects: Myth or reality?", *Journal of Macroeconomics*, 43, 226-238.
- Égert, B., 2015b, "The 90% Public Debt Threshold: The Rise and Fall of a Stylized Fact", *Applied Economics*, 47(34-35), 3756-3770.
- Eggertsson, G. B., Mehrotra, N. R. & Robbins, J. A., 2019, "A Model of Secular Stagnation: Theory and Quantitative Evaluation", *American Economic Journal: Macroeconomics*, 11(1), 1-48.
- Elmendorf, D. W. & Mankiw, G. N., 1999. *Government Debt*. In: Taylor, J., Woodford, M. (Eds.), *Handbook of Macroeconomics 1C*. North-Holland.
- Ewaida, H.Y.M., 2017, "The Impact of Sovereign Debt on Growth: An Empirical Study on GIIPS Versus JUUSD Countries", *European Research Studies Journal*, XX(2A), 607-633.
- Fatas, A. & Summers, L. H., 2018, "The Permanent Effects of Fiscal Consolidations", *Journal of International Economics*, 112, 238-250.
- Furman, J. & Summers, L., 2020, "A Reconsideration of Fiscal Policy in the Era of Low Interest Rates", Discussion Draft. Presentation to the Hutchins Center on Fiscal and Monetary Policy and Peterson Institute for International Economics, December 1, 2020. Available at: <https://www.piie.com/events/fiscal-policy-advice-joe-biden-and-congress>
- Gómez-Puig, M. & Sosvilla-Rivero, S., 2018, "Public Debt and Economic Growth: Further Evidence for the Euro Area", *Acta Oeconomica*, 68(2), 209-229.
- Gómez-Puig, M. & Sosvilla-Rivero, S., 2017, "Heterogeneity in the Debt-Growth Nexus: Evidence from EMU Countries", *International Review of Economics and Finance*, 51, 470-486.
- Gomez-Puig, M. & Sosvilla-Rivero, S., 2015, "The Causal Relationship Between Debt and Growth in EMU Countries", *Journal of Policy Modelling*, 37(6), 974-989.

- Herndon, T., Ash, M. & Pollin, R., 2014, "Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff", *Cambridge Journal of Economics*, 38(2), 257-279.
- Jacobs, J., Ogawa, K., Sterken, E. & Tokutsu, I., 2020, "Public Debt, Economic Growth and the Real-Interest Rate: A Panel VAR Approach to EU and OECD Countries", *Applied Economics*, 52(12), 1377-1394.
- Juergen, A., 2019, "Public Debt and Economic Growth Nexus: A Dynamic Panel ARDL Approach", *Munich Personal RePEc Archive*, 96023, September 2019.
- Karadam, D. Y., 2018, "An Investigation of Nonlinear Effects of Debt on Growth", *The Journal of Economic Asymmetries*, 18, 1-13.
- Kourtellos, A., Stengos, T. & Tan, C. M., 2013, "The Effect of Public Debt on Growth in Multiple Regimes", *Journal of Macroeconomics*, 38, 35-43.
- Krugman, P., 2013. How the Case for Austerity has Crumbled. *New York Review of Books*, 6 June Available at: <https://www.nybooks.com/articles/2013/06/06/how-case-austerity-has-crumbled>
- Kumar, M. S. & Woo, J., 2010, "Public Debt and Growth", *IMF Working Paper*, WP/10/174, July 2010.
- Lim, J. J., 2019, "Growth in the Shadow of Debt", *Journal of Banking and Finance*, 103, 98-112.
- Modigliani, F., 1961, "Long-Run Implications of Alternative Fiscal Policies and the Burden of the National Debt", *The Economic Journal*, 71(284), 730-755.
- Panizza, U. & Presbitero, A. F., 2014, "Public Debt and Economic Growth: Is There a Causal Effect?", *Journal of Macroeconomics*, 41, 21-41.
- Panizza, U. & Presbitero, A. F., 2013, "Public Debt and Economic Growth in Advanced Economies: A Survey", *Swiss Journal of Economics and Statistics*, 149(2), 175-204.
- Pegkas, P., Staikouras, C. & Tsamadias, C., 2020, "On the Determinants of Economic Growth: Empirical Evidence from the Eurozone Countries", *International Area Studies Review*, 23(2), 1-20.
- Proaño, C. R., Schoder, C. & Semmler, W., 2014, "Financial Stress, Sovereign Debt and Economic Activity in Industrialized Countries: Evidence from Dynamic Threshold Regressions", *Journal of International Money and Finance*, 45, 17-37.
- Puente-Ajovín, M. & Sanso-Navarro, M., 2015, "Granger Causality Between Debt and Growth: Evidence from OECD Countries", *International Review of Economics & Finance*, 35, 66-77.
- Reinhart, C. M. & Rogoff, K. S., 2010, "Growth in a Time of Debt", *American Economic Review*, 100(2), 573-78.
- Reinhart, C. M. & Rogoff, K. S., 2009, "The Aftermath of Financial Crises", *American Economic Review*, 99(2), 466-72.
- Romer, C. D. & Romer, D. H., 2018, "Phillips Lecture – Why Some Times are Different: Macroeconomic Policy and the Aftermath of Financial Crises", *Economica*, 85(337), 1-40.
- Romer, C. D. & Romer, D. H., 2017, "New Evidence on the Aftermath of Financial Crises in Advanced Countries", *American Economic Review*, 107(10), 3072-3118.
- Saint-Paul, G., 1992, "Fiscal Policy in an Endogenous Growth Model", *The Quarterly Journal of Economics*, 107(4), 1243-1259.
- Swamy, V., 2020, "Debt and Growth: Decomposing the Cause-and-Effect Relationship", *International Journal of Finance & Economics*, 25(2), 141-156.
- Tamborini, R. & Tomaselli, M., 2020, "When does Public Debt Impair Economic Growth? A Literature Review in Search of a Theory", *DEM Working Papers*, No 2020/7.

CORPORATE GOVERNANCE, COST OF CAPITAL AND TOBIN Q: EMPIRICAL EVIDENCE FROM TURKEY LISTED COMPANIES

BERNA DOĞAN BAŞAR
Gaziantep University, Turkey

Abstract

Corporate governance has become an important issue with the shaking of trust in companies, as a result of international financial crises, corruption and corporate scandals since the 1980s. Corporate governance is a broad concept and defines the methods, structure and processes of a firm. In this context, the concept of corporate governance plays an important role in ensuring the firm's progress in the right direction and in an optimal way. In this study, the effect of corporate governance practices on firm performance and capital cost is investigated empirically in 46 manufacturing companies listed on Borsa Istanbul between 2010-2019. In this context, the difference GMM proposed by Arellano-Bond (1991) and the dynamic GMM estimator developed by Arellano-Bover (1995) were used. As a result of the study, it has been determined that corporate governance mechanisms have an impact on the performance and capital cost indicators of firms resulting in a positive effect.

JEL Classification: G34, D24, G11

Keywords: Corporate Governance, Cost of Capital, TobinQ, Borsa Istanbul.

We would like to thank the Editor-in-Chief of the review for the time and effort devoted to reviewing the manuscript.

Corresponding Address: **Berna DOĞAN BAŞAR** Res. Assist., Gaziantep University, Faculty of Economics and Administrative Sciences, Department of Business Administration, Accounting and Financing, 27310 Gaziantep, Turkey. E-mail: bernadogan@gantep.edu.tr

1. Introduction

A series of unexpected corporate failures in the 1990s has attracted attention to the importance of the corporate governance system. After the financial scandals, a problem of trust concerning companies has arisen and companies were faced with the necessity of proving their credibility. As a result, large firms have had to prepare annual reports that address and explain their corporate governance procedures. In addition, reports have been prepared by international organisations around the world, such as the OECD, stock exchanges and various governments, and some have established corporate governance principles (Tosuni, 2013: 8).

In the early 20th century, firms in the United Kingdom, the United States and many other developed countries became large and complex. The number of stakeholders started to increase and spread geographically all over the world. Most of the firms had shares traded on the stock exchange, and, while the number of intermediaries has increased, investors and managers have become increasingly distant from each other. Over the years, many questions have arisen, such as the requirement of having an audit committee as a permanent institution composed of independent external directors, and the role of state enterprises in society and their legal and moral obligations (Cadbury, 1992: 17).

The collapse of the early 21st century, a new collapse that hit the entire world, was followed by the 2007-2008 crisis. As a result of this financial crisis, significant weaknesses have emerged in relation to corporate governance. This is because those in charge of financial services in the company fail to protect their companies from taking extraordinary risks and management programmes do not serve their purpose. All this has demonstrated the importance of qualified supervision of the board of directors and joint risk management, as well as widely accepted standards and the importance of further development of the Code (Kirkpatrick, 2009: 3). The Code has changed over the years and the last edition of the Corporate Governance Principles was published in 2014 by the Financial Reporting Council.

Recently, the term 'Corporate governance' has become popular, due to increasing concerns about corporate fraud and fraudulent financial reporting, among professional bodies in both developed and developing economies in different environments, such as regulators and academics. After the collapse of many companies around the world, interest in corporate governance has increased in both institutional and academic research (Shah *et al.* 2009: 626). However, it makes it difficult for corporate governance to have a generally accepted definition because of differences in culture, legal systems and historical developments from country to country. Researchers develop their own ideas on how to define 'corporate governance' in the disciplines of law, economics, accounting and management (Armstrong *et al.* 2005: 35). In other words, there is no general definition of corporate governance in the world. Because this concept can be defined in different ways, depending on where, for what purpose and by whom, it may vary from country to country and, even, from institution to institution.

The concept of corporate governance can be viewed from two perspectives, namely a narrow and a broad one, depending on the views of policy makers, practitioners and theorists (Solomon, 2010: 1). From a narrow perspective, corporate governance may be aiming to maximise stakeholders and protect them as much as possible; however, from a broader perspective, it is also responsible for ensuring that stakeholders other than those of the company's can make decisions more easily (Maher and Andersson, 2000: 3). In other words, from a narrow perspective, while corporate governance strengthens relationships between stakeholders, executives, auditors and other stakeholders, from a broad perspective, corporate governance covers investor confidence, efficient capital allocation and welfare development in economies (Fülöp, 2014: 617). In general, while corporate governance refers to private and public institutions in a market economy, including laws, regulations and accepted business practices governing the relationship between firm managers and entrepreneurs, on the other hand, it also emphasises the investment of resources in firms (Oman, 2001: 13). The term corporate governance mainly refers to the relationships between governance, board of directors, shareholders and other stakeholders in a firm. These relationships provide a framework for setting corporate goals and monitoring performance (Mehran, 2003: 1).

The issue of capital cost has become one of the most popular and debated issues in finance, especially since the second half of the 20th century. The two most important points in these discussions are the following: in today's large-scale companies the problem of investing high amounts of capital in accordance with the principle of rationality and cost calculations, in particular equity cost calculations, is a complex process requiring the adoption of a specific stock valuation method and including the concept of opportunity cost (Tecer, 1980:1).

The cost of capital of enterprises varies according to their capital structure. It is important to know the costs of the resources used to maximise the welfare of stakeholders in the enterprises and to strive to reduce costs by creating an optimal combination between debt and equity. In this context, it is of great importance for the economy, as well as for the firm, that the cost of capital be calculated accurately or, at least, as accurately as possible. While a high capital cost calculated leads to the rejection of a project and decreases growth rate, a low capital cost calculated, on the other hand, has an adverse effect on the economy by disrupting optimal distribution of resources. In this sense, the cost of capital constitutes a criterion for the company in making investment decisions. Accurate calculation of capital cost is of great importance in the following matters (Uzkaralar, 2017: 96).

- Making financial decisions;
- Determining and maximising company value;
- Making accurate investment decisions and capital budgeting decisions;
- Determining an optimal capital structure;
- Making decisions about issues such as bond issuance, leasing and asset management.

Firms can achieve results, such as better access to external financing, higher firm performance, and lower costs, by implementing the corporate governance system. Turkey's benefit from these advantages depends on the ability to resolve socio-economic problems, to determine how to strengthen the capital market capacity and to establish ethical and general corporate governance standards. However, the global crisis in 2008 increased awareness of the need to develop a corporate management system to improve financial transparency in Turkey. Therefore, Turkey has given priority to corporate governance rules in order to enhance its economy. In this context, corporate governance principles and internal control mechanisms need to be improved first of all.

The purpose of this study is to investigate the role of corporate governance in regard to firm performance and cost of capital. In this context, the relationship between corporate governance practices, firm performance and capital cost for BIST Manufacturing Industry firms between 2010-2019 have been empirically examined. What was used, in order to measure the variables of corporate governance mechanisms, firm performance and capital cost, was data from the annual activity and financial reports released on the Public Disclosure Platform of Borsa Istanbul website (investing.com) and the official website of the companies. Unlike other studies, this one also examines the relationship between corporate governance mechanisms and cost of capital.

2. Corporate Governance in Turkey

Firm scandals and financial crises have led to seeking new ways for countries to protect themselves. Therefore, countries have had to make legal arrangements in the field of corporate governance within the framework of their specific circumstances.

In Turkey, practices related to corporate governance started later than in other countries. When the world started to keep up with international commercial and economic developments, corporate governance practices became inevitable. With time, corporate governance has been established in Turkey with the help of civic society organisations and state-supported institutions.

The first studies in the field of corporate governance in Turkey were undertaken by TÜSİAD in 2002. TÜSİAD and other non-governmental organisations established the basis for corporate governance in Turkey. However, while these studies were being carried out, there was no "corporate governance" concept in legislation. It was in 2012 that the concept of corporate governance was included in the New TCC for the first time.

Institutions and legislators who regulate and supervise corporate governance have established rules by adhering to these principles. The first task completed, taking advantage of the best practices of regulatory institutions in Turkey, was realized by TÜSİAD, which is a non-governmental organisation. This study was called "Corporate Governance Code of Best Practice: Composition and Functioning of the Board of Directors". This study, carried out by TÜSİAD, was followed by legal

regulations and, thus, corporate governance acquired a legal dimension. Subsequently, the Capital Markets Board of Turkey (CMB) implemented a number of activities to encourage compliance with the regulations on corporate governance. A second study in this direction in Turkey concerned the establishment of the Corporate Governance Association in 2003 for adopting corporate governance in Turkey, developing and using best corporate governance practices. Another study, conducted in the same year, was carried out by the Capital Markets Board and, in 2003, corporate governance principles were put into practice in publicly traded companies. The study, which was prepared by the CMB in 2003, concerned the first legal regulation. Then, in 2006, the Banking Regulation and Supervision Agency (BRSA) established corporate governance principles for banks. However, important regulations have been made in the field of corporate governance system with the New Turkish Commercial Code No. 6102 (Alp and Kılıç, 2014: 106). The new Capital Market Law, No 6362 published on 30.12.2012, marked the beginning of a new era in terms of corporate governance legislation. These regulations, which were updated in time and finalised in 2014 and titled Corporate Governance Communiqué, ensured any public company in Turkey and this is very important in terms of compliance with corporate governance principles. These regulations are based on the principles set by the OECD. In addition, the Turkish Commercial Code, which entered into force in 2012, introduced important provisions concerning Boards of Directors and General Assemblies. Legislative provisions to make the audit mechanism more effective, albeit softened with subsequent amendments, were a serious step taken in this regard. The concept of corporate governance in the “Duties and Powers” section of the previous law has been examined in detail under the heading “Corporate Governance Principles” in the third section of the New Capital Market Law. One of the important points discussed in this section is the application of equal rules for all firms under equal conditions in order to prevent unfair competition. Another important point is that publicly held companies must launch the transactions to be determined by the Board after the decision of the Board of Directors. The CMB also established the BIST Corporate Governance Index (XKURY) in 2007. Companies graded on compliance with corporate governance principles were included in the index and discounts were made on the charges imposed on these firms. Thus, companies were encouraged to rate their levels of compliance with corporate governance principles in order to enjoy cost advantages. At the beginning of the calculation (31.08.2007), four companies were included in the index and this number increased to seven at the end of 2007. In 2019, the total number of publicly traded companies in the index increased to 47.

As a result, those who work within the scope of corporate governance in Turkey and as heads of organisations that address this issue are: TUSIAD, BRSA, CMB and TKYD. Additionally, BIST, Public Oversight Authority (KGK) and the Corporate Governance Forum of Turkey (CGFT) also participate as organisations providing important contributions in this area.

Cost of Capital and Corporate Governance Relationship

Since Jensen and Meckling (1976) introduced the concept of proxy contest to finance theory, it has been accepted that weak corporate governance processes cause proxy problems and increase uncertainty about firms' future cash flows. Based on this premise, in theoretical and applied studies, the relationship between corporate governance and capital cost has begun to be examined, and research aspiring to reveal the direction of this relationship has gained importance (Uzkaralar, 2017: 135).

Corporate governance offers a number of mechanisms that aim to reduce the costs of proxy arising from asymmetric information. These mechanisms ensure independent supervision of firm management and enable effective decisions to be taken to increase firm value. These mechanisms prevent company management from adopting opportunistic behaviours in their favour and promote practices that prevent firm value decrease. In addition, corporate governance practices enable access to more transparent financial information and public disclosure of more private information, while reducing risks faced by investors, and make it easier for firms to find more cost-effective financing (Ashbaugh *et al.* 2004: 6).

Good corporate governance practices prevent cash flow seizing and violating the rights of minority shareholders and managers who control power. With increased corporate governance quality, investors have more confidence in a company. Increasing the confidence of investors provides a firm more capital flows at a lower cost (La Porta *et al.*, 2002: 1164). Good corporate governance practices offer to both shareholders and other stakeholders important assurance that their rights are protected, help companies reduce their cost of capital and facilitate company access to capital markets. Successful corporate governance practices, while reducing the capital cost of firms, increase financing facilities and liquidity to provide more funds from capital markets (Öztürk and Demirgüneş, 2008: 395).

Company Performance and Corporate Governance Relationship

A company's performance is significantly affected by corporate governance. If functions are appropriately created for the corporate governance system, it attracts investments and maximises the funds of the firm, enhancing its strength and resulting in the firm performance increase desired. In other words, effective corporate governance protects the firm against potential financial difficulties and increases growth. Therefore, corporate governance plays a key role in the growth of firm performance (Ehikioya, 2009: 232).

Scientific research shows that international investors find corporate governance practices in companies at least as important as their financial performance, that they think this issue is more important for countries that need to reform investment decision making and that are ready to pay more for companies with good corporate governance practices (CMB, 2003: 2).

3. Data and Methodology

3.1 Sample

Data were obtained from two sources: firstly, information regarding companies' corporate governance practices was manually collected from the annual reports of companies on the Public Disclosure Platform (PDP) website. Secondly, financial data were collected from the Finnet database. The manufacturing industry sector is discussed since it includes companies with the highest market liquidity and assets in the Istanbul Stock Exchange (ISE). The research was carried out on 46 manufacturing industry companies continuously traded in Borsa Istanbul between 2010 and 2019. Although the total number of BIST manufacturing industry companies was 178, as of 2018, 46 companies, which published their annual reports between 2010 and 2019 without interruption and the variables of which were determined in the analysis, were included in the study. Sample firms are distributed among many sectors of the economy (Table 1).

Table 1. Firms by Industry

Paper and Paper Products, Printing and Publishing	3	6.52
Textile, Apparel and Leather	5	10.87
Non-Metallic Mineral Products	6	13.04
Food, Beverage and Tobacco	9	19.57
Fabricated Metal Products, Machinery, Electrical Equipment, and Transportation Vehicles	11	23.91
Other	1	2.17
Chemicals, Petroleum, Rubber and Plastic Products	8	17.39
Basic Metal	3	6.52
Total	46	100.00

3.2. Variables

Measurement of Corporate Governance Quality

Although various approaches have been proposed in relevant literature to evaluate corporate governance, there is no consensus (Regalli and Soana 2012; Zhu 2014; Bozec *et al.* 2014; Abobakr, 2017). Studies suggest indicators that include a variety of corporate governance practices, which provide a comprehensive view of the quality of a company's corporate governance (Aguilera and Desender, 2012). These indicators are based on various factors, such as board structure and property structure characteristics (Correia *et al.* 2011; Ntim, 2013; Titova, 2016; Vintilă and Paunescu 2016; Detthamrong *et al.* 2017; Bebchuk *et al.* 2017; Suryanto *et al.* 2017; Gafoor *et al.* 2018; Assenga *et al.* 2018; Hakimi *et al.* 2018; Sarkar and Sarkar, 2018; Lewellen and Katharina 2018).

In this study, seven independent variables were used as corporate governance variables, including board size (BOARD), ratio of women managers on the board of directors (WOMEN), range of institutional investor ownership (OWN), ratio of foreign managers in the board of directors (FOR), ratio of independent members of the board of directors (IND), Chairperson's Busy (BUSY) and CEO duality (CEO). These variables are explained below.

Board Size: This variable, which represents the size of the board, was added to the model by taking the logarithm of the number of board members. Board size (BOARD), within the framework of the authority granted by shareholders at the general assembly, uses its powers and responsibilities in line with internal regulations, legislation, policies and the main contract and represents the company (CMB, 2014: 24). When making decisions, BOARD aims to maximise the firm's market value. For this purpose, BOARD performs the company's business in a way that ensures shareholders make a long-term and stable profit. While doing this, BOARD also takes care not to disturb the delicate balance between stakeholders and growth requirements of the firm (CMB, 2003: 37).

Women Managers on the Board of Directors: This variable was added to the model by proportioning the number of women board members to the total number of board members. The representation of women in the board of directors has recently been examined as an important matter because women's boards of directors highlight the benefits of gender diversity on financial performance (Julizaerma and Sori, 2012: 1083). Most of the regulations on gender diversity concerning the participation of women in boards of directors are based on the view that women board members have a positive effect on the corporate governance of the firm. According to this view, boards of directors can increase their activities by incorporating women board members and creating a wider pool of talent (Adams and Ferreira, 2009: 292). At the same time, it is stated that women board members can contribute positively to the value of the company with the different perspective they will contribute to the decision-making process (Karayel and Doğan, 2014: 76).

Foreign Managers in the Board of Directors: This variable was added to the model by proportioning the number of foreign board members to the total number of board members. Foreign managers can bring new technology and modern management techniques to the firm, improve corporate governance, apply better supervision, and then improve firm performance. Particularly, in developing countries, such as Turkey, foreign investors are needed to cover current account deficits. The implementation of corporate governance practices, in accordance with international standards, is one of the most important guarantees for foreign investors (Özsöz *et al.* 2014). Oxelheim and Randoy (2003) have identified a significantly higher value for companies with foreign board members by establishing a sample from companies based in Norway or Sweden.

Independent Members of the Board of Directors: Fama and Jensen (1983b) show that managers of higher independence boards are more effective than less independent committees. External directors can decide more independently and are better decision-makers over long periods of time. Cadbury (1992) argues that independence of managers increases the attention of the board. Independent managers' financial 'freedom' enables them to monitor the company more efficiently and this is a strong point that helps managers control opportunistic behaviour. A number of reforms have been made to improve corporate governance practices related to board independence.

Chairperson's Busy: The chairperson of the board is defined as 1 if it has 3 or more posts and 0 if not. Busy executives are generally expected to be less active observers than those participating in fewer committees. Managers may need to spend more time and attention in order to effectively carry out their complex tasks, and the supervisory and consulting roles that need their attention. Therefore, it can be said that a busy manager has a negative effect on firm performance and cost. Core *et al.* (1999) found that the number of busy managers was associated with less effective corporate governance and higher CEO salaries. Fich and Shivdasani (2005) document that when managers serve on three or more boards, firms have lower market value book value ratios and exhibit lower operating profitability.

Institutional Investor Ownership: This is obtained through dividing the number of shares institutional investors hold by the number of firm shares in circulation. This ratio shows the proportion of the shares in circulation purchased by institutional investors. As corporate investors avoid risky investments, increasing institutional investor ownership may mean reducing the risk level of the firm or following a more risk-free policy than other companies. The performance of companies undertaking less risk may increase, but decrease may be seen in the performance of these firms because they cannot take advantage of opportunities.

CEO Duality: The duality of the CEO is that the general manager is also the chairperson of the board of directors. The general manager is also defined as 1 if the chairperson of the board of directors, and 0 if not. According to the representation theory, the duality practice creates a unity of command that enables the firm to focus on its objectives and make decisions faster (Boyd, 1995: 302). According to the resource dependence theory, the fact that the chairperson or member of the board is also the CEO may reduce the number and diversity of resource links outside the company. Therefore, strong leadership structure resulting from such duality will adversely affect firm performance.

In the study, leverage ratio and standard deviation of stock returns were used as control variables.

Leverage Ratio: It is calculated by proportioning the total liabilities of firms to their total assets. What this ratio reveals is what percentage of the assets are financed by debt. The ability of firms with a high total debt ratio to continue their operations

depends on debt. If this ratio is too high, the risk of the firm may increase and it may fall into financial distress or even face bankruptcy. Therefore, mobility at this rate may have an impact on the performance of a firm's financial structure and on WACC. While highly leveraged firms are risky, they will not always be able to repay their debts and obtain new loans. While high leverage is often a negative situation, the debt investment relationship may positively affect firms' return on equity (Doğan, 2013: 127).

Standard Deviation of Stock Returns: In an effective capital market, investors use the best conditional estimates of variables, such as standard deviation of stock returns, affecting the expected return on the market. Information on stock returns is important both for general investors and stakeholders of publicly traded companies. Market anomalies help investors gain from market movements. Standard deviation is a measure used to estimate how much a random variable in statistics varies from its average. In investment, the standard deviation of return is used as a risk measure. The higher the value, the higher the return volatility of a given asset. The standard deviation of monthly stock returns, calculated over a rolling 10-year window, is used to control for total risk in the regressions involving Q and cost.

Models and Methods: Within the scope and aim of the study, the following models have been developed and the effects of corporate governance mechanisms (management and ownership structure) on firm performance and cost of capital have been investigated. Relationship testing models are shown below:

$$WACC_{it} = \beta_0 + \beta_1 WACC_{i(t-1)} + \beta_2 BOARD_{it} + \beta_3 WOMEN_{it} + \beta_4 OWN_{it} \\ + \beta_5 CEO_{it} + \beta_6 FOR_{it} + \beta_7 IND_{it} + \beta_8 BUSY_{it} + \beta_9 LEV_{it} + \beta_{10} SD_{it} + \varepsilon_{it}$$

$$TOBINQ_{it} = \beta_0 + \beta_1 TOBINQ_{i(t-1)} + \beta_2 BOARD_{it} + \beta_3 WOMEN_{it} + \beta_4 OWN_{it} \\ + \beta_5 CEO_{it} + \beta_6 FOR_{it} + \beta_7 IND_{it} + \beta_8 BUSY_{it} + \beta_9 LEV_{it} + \beta_{10} SD_{it} + \varepsilon_{it}$$

Where, t denotes the time period; i refers to the firm; ε_{it} is the error term. The model also includes the weighted average cost of capital (WACC), the Tobin Q ratio (TOBINQ), the size of the board (BOARD), the proportion of women managers on the board (WOMEN), the proportion of foreign managers on the board (FOR), the proportion of independent members on the board (IND), CEO duality (CEO), the intensity of the chairperson of the board (BUSY), institutional investor ownership (OWN), standard deviation of stock returns (SD), and leverage ratio (LEV).

Calculation of Cost of Capital

Perhaps one of the most difficult and controversial issues in the discipline of finance is how to calculate the cost of capital and this calculation is of great importance for many segments. In practice, there are large differences in how the cost of capital should be determined. Despite some theoretical and practical challenges, it is imperative and useful for each firm to grasp the significance of the matter and, to the extent possible, make the necessary efforts to determine approximate values of the actual capital cost (Akgüç, 1998: 438).

In general terms, capital cost is the minimum rate of return expected from a firm's investments, which will satisfy both equity and lender investors. In practice, the cost of capital is found by the weighted average of the costs of funds obtained from different sources; in fact, however, the cost of capital is a function of the risk of firm assets and of the debt and equity. The weighted average cost of capital (WACC) method is often used when it is called cost of capital due to its easy implementation (Vernimmen, 2009: 448).

The basis of corporate governance is reducing the freedom to obtain special interests of managers and majority stakeholders and, thus, increase a firm's future cash flows, affecting the firm's value. In this context, Hail and Leuz (2006) argue that the valuation of corporate governance may reflect investors' risk premium demand. According to the authors, better corporate governance can reduce the problem of asymmetric information, so it can reduce the uncertainty of a firm's future cash inflows. Therefore, the higher the uncertainty and borrowing of cash flows, the higher the risk premium that investors and creditors will demand. This leads to increase in a firm's WACC.

There is consensus in the academic world and among finance managers on the search for the optimum capital structure that will minimise average capital cost for firms. In this context, the WACC method reflects the traditional approach to the cost of capital. In other words, the method is based on the assumption that a change in capital structure may affect the cost of capital (Akgüç, 1998: 472).

The WACC method requires that the cost of each of the funds used from various sources when carrying out company activities be known. In order to calculate average cost, it is necessary to know the ratios of various resources that make up a firm's capital structure. The calculation of a firm's capital cost uses the proportional weights of the resources used in funding and the cost calculated. Accordingly, costs and rates of ordinary shares, privileged shares, bonds and other long term resources, respectively, are calculated to arrive at the WACC of the company (Kaya, 2015: 195).

Funds provided by enterprises from various sources have separate costs for firms. WACC, on the other hand, is the sum of post-tax costs of various funding sources multiplied by their share in the firm's capital. This is represented in the following formula (Ceylan, 2000: 178):

$$WACC = \sum_{t=1}^n W_t i_t \quad (1)$$

Where,

WACC: Weighted average cost of capital

W_t : Share of "t" in total resources

i_t : Cost of resource "t"

If a firm's capital structure consists of more than one source, the weighted average cost of capital is calculated using the following equation (2):

$$i_0 = W_d i_d (1 - t) + W_i i_i + W_p i_p + W_r i_r + W_e i_e \quad (2)$$

Where,

i_0 : Weighted average cost of capital

i_d : Pre-tax cost of debt

i_i : Cost of spontaneous resources (such as taxes, premiums and fees, expenses to be paid)

i_p : Cost of resources provided by issuing privileged shares

i_r : The cost of undistributed profits

i_e : The cost of resources provided by issuance of ordinary shares

t: Tax rates

W: Share of each resource as a percentage of the total

In this study, WACC was calculated using the following formula:

$$WACC = W_d i_d (1 - t) + W_e i_e ,$$

where i_d represents the cost of debt, i_e the cost of equity calculated using the Capital Asset Pricing Model (CAPM), W_d the debt weight, W_e the weight of equity and t corporate tax rates. Debt weight is calculated as the value of the debt / the value of the debt + the value of equity, while the weight of the equity is calculated as the value of equity / value of the debt + the value of equity. In this equation, $W_d + W_e = 1$. Corporate tax rates are obtained from the Finnet programme. The cost of equity is calculated with the CAPM, as follows:

$$i_e = r_f + \beta_i \times (r_m - r_f)$$

where; r_f is the risk-free rate of return, β_i the systematic risk of shares (sensitivity to market risk), r_m the return of the market portfolio, and $r_m - r_f$ the market risk premium.

The 10-year bond interest data of Turkey's Treasury were used as a risk-free return in the cost of equity calculation and CAPM calculation. The annual return of the BIST 100 Index was used as the return of the market portfolio, and these data were obtained from the official website of Borsa Istanbul. The risk-free return in the relevant period is subtracted from the market return to calculate market risk premiums. Annual beta coefficients and cost of debt data were obtained from the Finnet programme. Market risk premium and beta coefficient are multiplied to obtain total risk premium data.

Some authors, such as Lambert, *et al.* (2007), Parigi, *et al.* (2015), Ali Shah and Butt (2009), and Qubbaja (2018), used CAPM to calculate the cost of equity.

Measuring Performance

Various performance measurement criteria are used to evaluate the performance of companies. A distinction is drawn between traditional and modern financial performance measurement criteria due to the increasing number of criteria and the differentiation of their calculation and use purposes. While traditional measures are described as accounting-based criteria, modern criteria are expressed as value-based criteria (Şenol and Ulutaş, 2018: 84).

The most prominent feature of traditional financial performance measurement methods is that they focus on company activities instead of stakeholder-based perspectives. Traditional criteria are based on accounting data. Therefore, traditional criteria are also called accounting-based financial performance criteria (Kuğu and Kırılı, 2013: 173). In performance measurement, data concerning profitability, balance sheet size, sales, costs and production, etc. are used. These performance measurement criteria, which can be monitored through financial statements or management accounting systems for most companies, show the firm's past performance (Gökbulut, 2009: 54). These criteria emerge by dividing the profit generated, as a result of accounting activities, by the value to be calculated, and are based on the results of activities occurring within a given period (Şenol and Ulutaş, 2018: 86). Examples of these are return on assets and return on equity.

Financial markets are the most intense realms of globalisation in the world. Today, it has become possible to reach almost all markets and stock exchanges around the world through opportunities provided by technology. As a result, as financial markets deepened, market participants became heterogeneous by losing their national and regional characteristics. In parallel with these developments, measurement and valuation methods based on market performance have become widely used by all investors and analysts (Şenol and Ulutaş, 2018: 88). The most important feature of value-based financial performance criteria is that they are approaches that take account of stakeholder value. Tobin Q ratio can be used to make investment decisions about a company. The Tobin Q ratio is mainly based on the ratio of the market value of the firm's financial rights to the replacement value of firm assets (Lee and Tomkins,

1999: 20). The replacement value of assets in the denominator of the ratio is quite difficult to calculate because of the lack of a market for certain obsolete capital goods (Lindenberg and Ross, 1981: 12). In order to overcome this difficulty and make the calculation easier, some researchers have calculated Tobin Q-like rates. These studies are based on the Tobin Q ratio but differ in share and denominator for some items. Some relevant studies in relevant literature are those by Lindenberg and Ross (1981), Chung and Pruitt (1994), Lewellen and Badrinath (1997), Lee and Tomkins (1999). The ratio is calculated by dividing the total market value of equity and the carrying amount of liabilities by the carrying amount of total assets. As a result of this ratio, findings are obtained on how investors evaluate a company. Companies that are admired by investors undertake low risk and show high growth rate (Brigham and Houston, 2011: 112). The market value included in the numerator of this ratio is value in terms of supply and demand under the market conditions of a share. The ratio is proportionate to the equity of a firm's market value.

Data related to the variables used in the analysis were obtained from the financial statements and footnotes of companies (investing.com website) and their annual activity reports. Data from the 2010-2019 period were obtained from the annual reports, web pages, and footnotes of companies and from the Public Disclosure Platform. In this study, annual data of 46 manufacturing companies traded on Borsa Istanbul were used and a total of 10 periods (2010-2019) were analysed. Variables and calculation methods used in the research are presented in Appendix.

4. Results

GMM is an effective estimation method classified as semi-parametric. There are significant advantages to using the GMM estimator instead of other estimators based on panel data. First, it is possible to control constant effects not changing over time using this method and horizontal-section fixed effects. Another advantage is that, in order to solve the internality problem that may occur with independent variables, it is possible to use the appropriate lag values of independent variables as tool variables (Albarran and Arellano, 2019: 18).

In dynamic panel analysis, there are two main GMM estimators, namely, the difference GMM and the system GMM. The consistency of the GMM estimator is tested by the Sargan test, which shows asymptotically χ^2 distribution for the GMM estimator. Because the data consider the time series property and do not include biased results to test the effects of corporate governance on weighted average cost of capital and firm value, this study used one of the dynamic panel estimation methods, i.e., the difference put forward by Arellano-Bond (1991), as well as the system GMM estimator developed by Arellano-Bover (1995).

The aim of this study is to investigate the relationship between corporate governance practices and capital cost and firm value. What will be revealed for this

purpose is the existence or absence of a relationship between corporate governance practices and capital cost and firm value; if there is a relationship, its direction will also be revealed.

Table 2 presents descriptive statistics on capital cost and firm performance and indicators on corporate governance quality. The table shows that firms have an average cost of capital (WACC) of 1.12. In parallel with the studies by Singhal 2014, Bangmek et al. 2018, Qubbaja 2018, Ilyas and Jan 2017, Khan 2016, the presence of firms with negative capital costs can also be mentioned with the effect of the cost of equity calculated with CAPM. The great decrease in returns of the market portfolio used in the calculation of equity cost with CAPM during crisis periods results in the equity cost being negative when compared to developed countries. A value of more than 1 in the ratio of TobinQ is a positive indicator for a company. Based on descriptive statistics, Tobin's average Q rate of 1.27 indicates that the average market value of businesses is higher than their book value and that businesses create value for shareholders. The logarithm of the average size of firms' boards of directors is about 1.94 and is smaller than that of developed countries. On average, 44% of firms have a dual position for the general manager and chairperson of the board of directors. In addition, on average, company boards hold 10% women board members, 14% foreign board members and 18% independent board members. Moreover, in 5% of companies, demanding duties are assigned on the chairmen of the board of directors. Firms also have about 58% institutional investor ownership.

Table 2. Descriptive Statistic

	Mean	Maximum	Minimum	Std. Dev.
WACC	1.120098	7.233000	-4.829000	2.083719
TOBINQ	1.267130	8.370000	0.370000	0.770194
BOARD	1.934957	2.710000	1.100000	0.290994
WOMEN	0.101990	0.500000	0.000000	0.123130
FOR	0.145397	1.000000	0.000000	0.232689
IND	0.182609	0.500000	0.000000	0.153751
CEO	0.441304	1.000000	0.000000	0.497083
BUSY	0.056522	1.000000	0.000000	0.231178
OWN	57.75197	100.0000	0.000000	26.14922
SD	0.874751	1.773168	-0.313279	0.312643
LEV	0.536804	1.130000	0.070000	0.193656

Table 3 presents is a cross correlation table. Change in the weighted average capital cost at the level shows positive correlation with the Tobin Q ratio. It was observed that there was a statistically significant correlation between most variables. According to this analysis, multicollinearity problems were not encountered between variables ($R < 90\%$).

Table 3. Correlation Matrix

Correlation Probability	WACC	TOBINQ	BOARD	WOMEN	FOR	IND	CEO	BUSY	OWN	SD	LEV
WACC	1.000000										

TOBINQ	0.025653	1.000000									
	0.5832	-----									
BOARD	-0.008590	0.079115	1.000000								
	0.8542	0.0901	-----								
WOMEN	0.009118	-0.101373	0.102669	1.000000							
	0.8454	0.0297	0.0277	-----							
FOR	-0.020803	0.358449	-0.023840	-0.129780	1.000000						
	0.6563	0.0000	0.6101	0.0053	-----						
IND	0.123613	0.085174	0.200885	0.008839	-0.093688	1.000000					
	0.0080	0.0680	0.0000	0.8500	0.0446	-----					
CEO	-0.058291	0.088219	0.026566	-0.081282	-0.013643	0.082395	1.000000				
	0.2121	0.0587	0.5698	0.0816	0.7704	0.0775	-----				
BUSY	-0.065492	-0.027964	0.114683	0.065691	-0.002964	0.000133	0.085809	1.000000			
	0.1608	0.5497	0.0139	0.1595	0.9495	0.9977	0.0659	-----			
OWN	0.039746	0.209008	0.106677	-0.230007	0.237187	-0.006297	-0.252365	-0.095448	1.000000		
	0.3951	0.0000	0.0221	0.0000	0.0000	0.8929	0.0000	0.0407	-----		
SD	-0.409446	-0.004385	-0.312695	-0.127916	0.110371	-0.400682	0.114970	-0.014959	-0.142984	1.000000	
	0.0000	0.9253	0.0000	0.0060	0.0179	0.0000	0.0136	0.7490	0.0021	-----	
LEV	-0.254268	0.083394	0.009881	-0.131026	0.117735	0.180566	0.214071	0.099425	-0.174597	0.084762	1.000000
	0.0000	0.0740	0.8326	0.0049	0.0115	0.0001	0.0000	0.0330	0.0002	0.0693	-----

Table 4 presents the results of difference GMM and system GMM estimators of the model regarding the relationship between capital cost and corporate governance mechanisms as well as the coefficients of the independent variables used to show the change in WACC.

The results were $WACC_{i(t-1)}$, lagged value of WACC dependent variable, and $TOBINQ_{i(t-1)}$, lagged value of TOBINQ dependent variable; the relationships between them were significantly inversely correlated at 1% level. Therefore, it is worth mentioning the negative effect of WACC from the previous period on the costs of capital for companies and the TOBINQ rates from the previous period on company profitability.

As shown in Table 4, where the results of the analysis conducted to investigate whether corporate management is effective on WACC and TOBINQ, increase in the size of the board has a positive effect on TOBINQ rates and WACC. According to these results, as the number of board members increases, profitability in companies increases

and capital cost decreases. This finding is confirmed by the work of Rad (2014), Anderson *et al.* (2003), Piot and Missonier-Piera (2007), Singhal (2014), Bozec *et al.* (2014), Bradley and Chen (2011), Belkhir (2009), Fauzi and Locke (2012), Veklenko (2016) and Berezinets *et al.* (2017). The result shows that the members of the board of directors are focused individuals with integrity and consistent behaviour and such a board can significantly increase firm value and reduce costs. More board members can also improve communication between all shareholders. This can have a positive effect on the company's performance and costs. In addition, this can be explained by the fact that boards with a high number of members provide more connections outside the firm, thus making it easier to access critical resources. Apart from that, large boards of directors can provide different advantages in obtaining information, which can positively impact company performance in the form of mergers and acquisitions. Although these results seem positive for the company, they may also be limiting. Larger boards of directors are also difficult to be put under pressure, and they are costly. In addition, if we combine this with representation theory there should be a limit on the number of members of the board of directors. It has been argued that there may be conflicts in terms of group dynamics in companies that exceed the limits specified, which may, consequently, have a negative effect on capital costs and the value of the company. The increase in the number of members of the board of directors may create an environment of conflict of interests and incompatibility among members, and may have a fluctuating effect on company costs. In weighted average capital cost calculations, equity cost is higher since the risk incurred is more than the borrowing cost. In this context, conflicts of interests and attitudes contrary to company interests may negatively affect shareholders, and, therefore, capital costs and performance.

The same is true when examining the ratio of women in the board of directors, which is another of the corporate governance mechanisms. The number of women on the board of directors shows a negative and statistically significant relationship with WACC and a positive and statistically significant relationship with TOBINQ. Considering these results, the increase in the number of women in companies' boards of directors decreases capital costs and increases company performance. This finding is confirmed by the work of Shrader *et al.* (1997), Carter *et al.* (2003), Campbell and Minguez-Vera (2008), Städtler (2016), Peni and Vähämaa (2010), and Usman, *et al.* (2019). If there are women members on the board, the independence of the board will increase. This will positively affect the value-based performance indicator TOBINQ and the cost indicator WACC. However, gender diversity can be seen as the process of presenting the different characters and abilities of women and men board members to the company. In addition, firms can increase their effectiveness by creating a wider pool of talent when women join as board members. Concerning women members in Turkey Serial: IV, No: 57 on "Corporate Governance Principles Communiqué

on Amending the Communiqué on the Determination and Implementation”, dated 11/02/2012, appeared in Official Gazette No 28201 and came into force. According to this communiqué, although there is no compulsory practice, the principle of “having at least one women member in the board of directors” has been introduced. The principle in question is advisory in accordance with the principle of “apply or explain if you do not apply” (Karayel and Doğan, 2014:76). This result supports the communiqué and can be recommended to increase the number of female members in the boards of directors since such action increases profitability and reduces costs for BIST companies. However, the situation in the number of members of the board of directors should not be ignored here. Although there are positive results achieved due to increasing the number of women in the board of directors, the board composition should be decided based on the maximum value and minimum cost point, after which there should be a limitation.

It is observed that the presence of independent board members also increases the company performance and the cost of capital. This finding is confirmed by the work of Hermalin and Weisbach (1991), Klein (2002), Agrawal and Chadha (2005), Dunn and Mayhew (2004), Weisbach (1988), Brickley *et al.* (1994), and Singhal (2014). The role of the board of directors is to provide independent supervision of the management and to hold management accountable for their activities to shareholders. If executives ally with each other, instead of protecting the interests of shareholders, the effectiveness of the board of directors may weaken. In this sense, the fact that the board of directors is not independent of the management is a management risk that may lead to decrease the shareholders’ wealth. The increased number of independent board members in the companies discussed in this study indicates that companies increase their performance but also their capital costs with a negative impact. When there are more independent managers, they will support useful monitoring and advisory functions, thereby strengthening monitoring shareholder funding. This will increase the performance and value of companies. Increase of independent members’ number in the board of directors will provide funds to companies and will help them provide cheaper funds and enhance confidence in terms of their investments; however, contrary to expectations, it has been concluded that the existence of independent board members lead to increased costs for firms.

According to the results of the analysis, the presence of foreign members on the board of directors positively affects the performance of firms while adversely affecting their costs. This finding is confirmed by the work of Ghazali (2010), Oxelheim and Randoy (2003), Sulong and Nor (2010), Marashdeh (2014), Ghazali (2010), Taufil-Mohd *et al.*, (2013), and Collin *et al.*, (2017). This is because foreign investors transfer their management skills and better technology and allow firms to easily access financial resources. This can help reduce conflict between managers and shareholders and affect firm performance. In addition, foreign investors can contribute to increased performance, increasing costs and operational efficiency by providing access to new

applications and technology. The results of the analysis in this study can be interpreted as indicating that new and expensive technology increases a company's needs and expenses, causing an increase in company capital costs.

When the effect of being the chairperson of the board of directors on the performance of the company was analysed for the same time period, it was determined that the CEO had a negative and significant effect on TOBINQ, the market-based performance indicator of duality. This finding is confirmed by the work of Brickley *et al.* (1994), Singh *et al.*, (2018), Kholief (2008), Amba (2014) ve Hafez (2015). According to the resource dependency theory, when the chairperson of the board is also the CEO, this can lead to decreased resource connections outside the firm, thereby reducing firm performance. In this context, results concerning TOBINQ support the resource dependency theory. Assessing the CEO duality practice for Turkey indicates that this makes it more difficult to supervise the general manager. One of the duties of the board of directors is to supervise the general manager. If the supervisor and the auditee are the same person, particularly within such a strong leadership structure, high performance of the company will be prevented. In other words, as a result of the separation of the two roles and their duties, while the general manager effectively manages the company, the chairperson of the board of directors will be able to supervise the work of the management. In addition, separating the duties of general manager and chairperson of the board of directors enables the board of directors to act more effectively and transparently. On the contrary, the CEO duality may cause the authority to be concentrated in the hands of one person and the general manager may act improperly. This situation can create problems for the company, preventing the independent decision making ability of the board of directors with the excessive increase of authority and making it difficult for strategic decisions to be reached.

A positive and significant relationship was determined between institutional investor ownership (OWN) and financial performance indicators and cost indicator. When these results are evaluated, in cases where institutional investor ownership (OWN) increases, the profitability of firms increases and so do their costs because they are negatively affected. This finding is confirmed by the work of Sias (1996), Aytakin and Sönmez (2016), Alipour and Amjadi (2011), Bhattacharya and Graham (2007), Potter (1992), Bushee and Noe (2000), Charfeddine and Elmarzougui (2010), and Ashbaugh *et al.*, (2004). It also shows that the presence of institutional investor potential has a positive effect on a firm's market value. As a result, increase in the number of corporate stakeholders will increase the reliability of the company for investors, which will positively affect company performance. Institutional investor presence has a positive effect because such investors have internal audit power and try to maximise their interests. More institutional investors in the board of directors should help companies provide funding and investment, and help them obtain cheaper funds. However, in this study, contrary to the expectations, it was indicated that firms increase their costs.

Table 4. Panel Data Analysis Results

Regressor	WACC	TOBINQ	WACC	TOBINQ
	Dynamic. diff. GMM		Dynamic Sys. GMM	
L-WACC	-0.289490**		-0.341646**	
L-TOBINQ		-0.124144**		-0.084585**
BOARD	-0.292569	0.533563**	-0.864507**	0.338095**
WOMEN	-3.403018 **	0.645599**	-2.223558**	0.275203**
IND	0.953941**	0.169428**	-0.049867	0.187265**
FOR	1.276314**	1.086245**	0.995234**	0.275021**
CEO	0.338083	-0.071671**	0.159337	-0.073504**
OWN	0.005006	0.003593**	0.013743**	0.001165
BUSY	-0.472315**	0.029234	-0.345420*	-0.042311**
LEV	-4.917122**	-0.145751*	-4.457720**	0.184107**
SD	-2.303288**	0.206858**	-1.637621**	0.251967**
Observations	460	460	460	460
J-Statistics	42.76503	42.55612	42.23772	43.83372
Arellano–Bond AR(1)	0.0000	0.0998	N/A	N/A
Arellano–Bond AR(2)	0.4438	0.1370	N/A	N/A

(*) and (**) show significance at the 5% and 1% levels, respectively. Dependent variables are weighted average capital cost (WACC) and Tobin Q ratio. In order to measure the effectiveness of variables, the J test, also known as the Sargan test, is insignificant and the acceptance of the null hypothesis shows that the variables are not only sufficient and valid, but also add more confidence to the model. Since the J-statistic probability value is insignificant in all established models, the independent variables used are considered to be significant. The reported p values for AR (1) and AR (2) are autocorrelation disorders in the first and second order first difference equations, and AR (1) should be meaningful and AR (2) should be meaningless. AR (1) and AR (2) results for System GMM are ignored due to data analysis using the Eviews programme.

A negative and statistically significant result was obtained between the BUSY variable, which measures the workload of chairmen, and capital costs and firm performances. This finding is confirmed by the work of Mohd *et al.*, (2016), and Fich and Shivdasani (2005). In this case, when the chairperson of the board holds 3 or more positions at the same time, there is a decrease in company performance and costs. We can express the decrease in costs by better following the progress in boards where the chairperson of the board is active, establishing a connection between boards and enabling each board to make less costly decisions. Inter-board information is more easily disseminated and costs are managed accordingly.

When the results of leverage ratio (LEV), which is the control variable, were analysed, a negative and statistically significant relationship was detected between WACC and LEV, while a positive and statistically significant relationship was observed between LEV and TOBINQ, at 1%, according to the system GMM result. This finding is confirmed by the work of Khatab *et al.*, (2011), Sagala (2003), Singhal (2014), Zhu (2014), Bozec *et al.*, (2014). Accordingly, it can be said that increase in total debts or decrease in total assets, while total debts are fixed, decreases the cost of capital and increases financial performance. The reducing effect of the leverage ratio on capital cost can be attributed to the fact that the debt provides a tax advantage and, thus, the debt is cheaper than equity. It can be seen that the leverage factor positively affects capital cost and firm value. It has been determined that the standard deviation of stock returns, which is another control variable, while enhancing a firms' performance, it has a negative impact on capital costs. This finding is confirmed by the work of Sharfman and Fernando (2008), El Ghouli *et al.* (2011). Based on this, stock returns can be said to have a positive effect on firms' performance and costs.

Table 5. Panel Data Analysis Results

Regressor	WACC	TOBINQ	WACC	TOBINQ
	Pooled		Fixed-Effects Panel	
BOARD	-0.924403**	0.222496**	-0.114409	0.222214
WOMEN	-0.685683	0.205655*	-0.797167	-0.015374
IND	0.129063	0.152536	1.471810*	-0.541497*
FOR	0.446636	0.662466**	0.585120	0.046996
CEO	0.095116	0.098784**	0.113333	-0.071634
OWN	-0.008792**	0.002379**	0.012428	0.003129
BUSY	-0.323771	-0.075792	-0.349064	-0.085111
LEV	-2.590719**	0.303779**	-2.062765**	0.188393
SD	-2.759407**	-0.027529	-1.498172**	0.448475**
Constant	7.194664	0.260609	2.738726	0.293043
Observations	460	460	460	460
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
No. of firms	46	46	46	46
R ²	0.288022	0.282025	0.764432	0.820345

(*) and (**) show significance at the 5% and 1% levels, respectively.

Models are also estimated using OLS for additional robustness of results. Table 5 provides estimates for WACC and TOBINQ as the dependent variable. Results from OLS estimates confirm previous findings. The OLS model makes predictions for specific dimensions of corporate governance (board structure and features and senior management).

Conclusion

This study has investigated whether the quality of shareholders under the control of Turkish firms is closely related to good corporate governance practices, which is a relevant research topic in recent literature. Based on the importance of corporate governance, the purpose of this study is to examine the impact of corporate governance practices of manufacturing industry companies the shares of which are traded on Borsa Istanbul (BIST), on TOBINQ, and on capital cost. The research included 46 companies continuously involved in the BIST manufacturing industry between 2010 and 2019, the annual reports of which could be accessed and obtained. In this context, since the data can be fully observed, balanced panel data analysis was performed in order to reach more accurate results. Two regression models have been developed within the scope of the research. Since the J-statistical probability value is meaningless in all of the established models, the independent variables used are considered valid.

Findings show that a good corporate management system will reduce capital costs of firms and increase their performance, thereby having a positive impact on firms' values. As a result of the study, a negative relationship was determined for the variables of capital cost and the size of the board of directors, the ratio of female members on the board of directors, and the workload of the chairperson. In this context, increasing these variables can reduce the costs of companies. Firms can effectively increase their profits by making efficient arrangements in these areas without losing this advantage. On the other hand, increasing the number of foreign members in the board of directors as well as corporate investor ownership may cause an increase in company costs in terms of turning to modern and advanced technology. This increase is a negative factor in terms of companies, but a positive and value-creating factor in terms of performance. As a result, corporate governance practices of companies can provide the opportunity to minimise costs, while adding value to the companies. In this respect, it is important for the top management of companies and legislators to make arrangements in these areas and to favour them.

The general purpose of companies is to incur minimum cost and and gain maximum benefits. In this context, in terms of companies operating in Turkey, the weighted average cost of capital in the equity market conditions, its ability to decrease the most intense costs is important for recovery. Corporate governance practices are also an important factor at the level of firms in ensuring the protection of investors and reducing the weighted average capital cost, and, consequently, the cost of equity. In this

context, firms can reduce their risk-taking behaviours and lower their own-fund costs. In addition, the risk-free rate of return should decrease and the risk premium should also be reduced. Thus, firms' cost of obtaining funds from equity will decrease. The findings obtained in this research are important for investors, in terms of improving the investment environment, for financial regulators aspiring to encourage economic development, for researchers in view of developing new models and top management of companies seeking to improve company performance.

References

- Abobakr, M. G. (2017). "Corporate Governance And Banks' performance: Evidence From Egypt", *Asian Economic and Financial Review*, 7(12), 1326-1343.
- Adams, R. B. and Ferreira, D. (2009). "Women in The Boardroom and Their Impact on Governance and Performance", *Journal of Financial Economics*, 94, 291-309.
- Albarran, P., and Arellano, M. (2019). GMM Estimation from Incomplete and Rotating Panels. *Annals of Economics and Statistics*, (134), 5-42.
- Ali Shah, S. Z., and Butt, S. A. (2009). The impact of corporate governance on the cost of equity: empirical evidence from Pakistani listed companies. *The Lahore Journal of Economics*, 14(1), 139-171.
- Amba, S. M. (2014). "Corporate Governance and Firms' Financial Performance", *Journal of Academic and Business Ethics*, 8, 1-10.
- Arellano, M. and Bond, S. (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and An Application to Employment Equations", *The Review of Economic Studies*, 58(2), 277-297.
- Arellano, M. and Bover, O. (1995). "Another Look at The Instrumental Variable Estimation of Error-Components Models", *Journal of Econometrics*, 68, 29-51.
- Armstrong, P., Segal, N. and Davis, B. (2005). *Corporate Governance South Africa, A Pioneer in Africa*. The South African Institute of International Affairs.
- Ashbaugh, H., Collins, D. W., and LaFond, R. (2004). *Corporate governance and the cost of equity capital*. Emory, University of Iowa. Retrieved on January, 26, 2006.
- Assenga, M. P., Aly, D., and Hussainey, K. (2018). The impact of board characteristics on the financial performance of Tanzanian firms. *Corporate Governance: The International Journal of Business in Society*.
- Akgüç, Ö. (1998). *Finansal Yönetim*. İstanbul: Avcıol Basım Yayın.
- Alp, A. and Kılıç, S. (2014). *Kurumsal Yönetim Nasıl Yönetilmeli? İstanbul: Doğan Kitap*.
- Alipour, M. and Amjadi, H. (2011). "The Effect of Ownership Structure on Corporate Performance of Listed Companies in Tehran Stock Exchange: An Empirical Evidence of Iran", *International Journal of Business and Social Science*, 2 (13), 49-55.
- Anderson, R. C., Mansi, S. A. and Reeb, D. M. (2003). "Founding Family Ownership and The Agency Cost of Debt", *Journal of Financial Economics*, 68(2), 263-285.
- Aguilera, R. V., Desender, K. A., and Kabbach de Castro, L. R. (2012). A bundle perspective to comparative corporate. *The SAGE handbook of corporate governance*, 379-405.
- Agrawal, A., and Chadha, S. (2005). Corporate governance and accounting scandals. *The Journal of Law and Economics*, 48(2), 371-406.
- Aytekin, M. and Sönmez, A. R. (2016). "Kurumsal Yönetim Uygulamalarının İşletme Performansına Etkisi", *Türk Sosyal Bilimler Araştırmaları Dergisi*, 1(2), 32-41.
- Bebchuk, L. A., Cohen, A. and Hirst, S. (2017). "The Agency Problems of Institutional Investors", *Journal of Economic Perspectives*, 31, 89-102.

- Belkhir, M. (2009). "Board of Directors' Size and Performance in The Banking Industry", *International Journal of Managerial Finance*, 5(2), 201-21.
- Berezinets, I., Ilina, Y. and Cherkasskaya, A. (2017). "Board Structure, Board Committees and Corporate Performance in Russia", *Managerial Finance*, 43(10), 1073-1092.
- Bhattacharya, P. S. and Graham, M. (2007). "Institutional Ownership and Firm Performance: Evidence from Finland", Deakin University, Department of Economics, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1000092, Erişim Tarihi: 17.12.2018.
- Bangmek, R., Yodbutr, A., and Thanjunpong, S. (2018). Cost of equity and disclosure of management's responsibility for financial reports of firms in Thailand. *Kasetsart Journal of Social Sciences*.
- Boyd, B. (1995). "CEO Duality and Firm Performance: A Contingency Model", *Strategic Management Journal*, 16, 301-312.
- Bozec, Y., Laurin, C. and Meier, I. (2014). "The Relation Between Excess Control and Cost of Capital", *International Journal of Managerial Finance*, 10(1), 93-114.
- Bradley, M. and Chen, D. (2011). "Corporate Governance and The Cost of Debt: Evidence from Director Limited Liability and Indemnification Provisions", *Journal of Corporate Finance*, 17(1), 83-107.
- Brickley, J. A., Coles, J. L. and Terry, R. L. (1994). "Outside Directors and The Adoption of Poison Pills", *Journal of Financial Economics*, 35(3), 371-390.
- Brigham, E. F., and Houston, J. F. (2011). *Study Guide for Brigham/Houston's Fundamentals of Financial Management, Concise Edition, 7th*. Cengage Learning.
- Bushee, B. and C. F. Noe. (2000). "Corporate disclosure practices, institutional investors, and stock return volatility." *Journal of Accounting Research* 38, 171-207.
- Cadbury, A., (1992), *The Financial Aspects of Corporate Governance*. Cadbury Report, The Cadbury Committee, London, UK.
- Carter, D. A., Simkins, B. J., and Simpson, W. G. (2003). Corporate governance, board diversity, and firm value. *Financial review*, 38(1), 33-53.
- Campbell, K., and Mínguez-Vera, A. (2008). Gender diversity in the boardroom and firm financial performance. *Journal of business ethics*, 83(3), 435-451.
- Charfeddine, L. and Elmarzougui, A. (2010). "Institutional Ownership and Firm Performance: Evidence from France", *IUP Journal of Behavioral Finance*, 7(4), 35-46.
- Ceylan, A. (2000). *İşletmelerde Finansal Yönetim*. Bursa: Ekin Kitabevi.
- Core, J. E., Holthausen, R. W., and Larcker, D. F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of financial economics*, 51(3), 371-406.
- Correia, LF, Amaral, HF, and Louvet, P. (2011). An index for assessing the quality of corporate governance in Brazil. *Revista Contabilidade & Finanças* , 22 (55), 45-63.
- Collin, S. O. Y., Ponomareva, Y., Ottosson, S., and Sundberg, N. (2017). Governance strategy and costs: board compensation in Sweden. *Journal of Management & Governance*, 21(3), 685-713.
- CMB. (2003). Kurumsal Yönetim İlkeleri. https://ecgi.global/sites/default/files//codes/documents/kyy_tr.pdf, Date of Access: January 22, 2019.
- CMB. (2014). Kurumsal Yönetim Tebliği (II-17.1). <http://www.spk.gov.tr/Duyuru/Goster/20140103/3>, Date of Access: 12.04.2019.
- Chung, K. H. and Pruitt, S. W. (1994). "A Simple Approximation of Tobin's q", *Financial Management*, 23(3), 70.
- Detthamrong, U., Chancharat, N. and Vithessonthi, C. (2017). "Corporate Governance, Capital Structure and Firm Performance: Evidence from Thailand", *Research in International Business and Finance*, 42, 689-709.
- Doğan, M., (2013). "Sigorta Firmalarının Sermaye Yapısı ile Karlılık Arasındaki İlişki: Türk Sermaye Piyasası Üzerine Bir İnceleme", *Muhasebe ve Finansman Dergisi*, 57, 121- 136.

- Dunn, K. A., and Mayhew, B. W. (2004). Audit firm industry specialization and client disclosure quality. *Review of accounting studies*, 9(1), 35-58.
- Ehikioya, B. I. (2009). "Corporate Governance Structure and Firm Performance in Developing Economies: Evidence from Nigeria", *Corporate Governance: The International Journal of Business in Society*, 9(3), 231-243.
- El Ghouli, S., Guedhami, O., Kwok, C. C., and Mishra, D. R. (2011). Does corporate social responsibility affect the cost of capital?. *Journal of Banking & Finance*, 35(9), 2388-2406.
- Fama, E. F., and French, K. R. (1992). The cross-section of expected stock returns. *the Journal of Finance*, 47(2), 427-465.
- Fama, E. F., and Jensen, M. C. (1983). Separation of ownership and control. *The journal of law and Economics*, 26(2), 301-325.
- Fauzi, F. and Locke, S. (2012). "Board Structure, Ownership Structure and Firm Performance: A Study of New Zealand Listed-Firms", *Asian Academy of Management Journal of Accounting and Finance*, 8(2), 43-67.
- Fich, E.M. and Shivdasani, A. (2005) Are Busy Boards Effective Monitors? *The Journal of Finance*, LXI, 689-724.
- Fülöp, M. T. (2014). "Why Do We Need Effective Corporate Governance?," *International Advances in Economic Research*, 20(2), 227-228.
- Gafoor, C. A., Mariappan, V., and Thyagarajan, S. (2018). Board characteristics and bank performance in India. *IIMB management review*, 30(2), 160-167.
- Gökbulut, R. İ. (2009). *Paydaş Değeri ile Finansal Performans Ölçütleri Arasındaki İlişki ve İMKB Üzerine Bir Araştırma*. İstanbul Ticaret Üniversitesi, Sosyal Bilimler Enstitüsü, Doktora Tezi, İstanbul.
- Ghazali, N. A. M. (2010). Ownership structure, corporate governance and corporate performance in Malaysia. *International Journal of Commerce and Management*.
- Hafez, H. M. (2015). "Corporate Governance and Financial Performance: An Empirical Study on Egyptian Banks", *Corporate Ownership ve Control*, 13(1), 1359-1374.
- Hakimi, A., Rachdi, H., Mokni, R. B. S., and Hssini, H. (2018). Do board characteristics affect bank performance? Evidence from the Bahrain Islamic banks. *Journal of Islamic Accounting and Business Research*.
- Hail, L. and Leuz, C. (2006). "International Differences in The Cost of Equity Capital: Do Legal Institutions and Securities Regulation Matter?," *Journal of Accounting Research*, 44(3), 485-531.
- Hermalin, B. E., and Weisbach, M. S. (1991). The effects of board composition and direct incentives on firm performance. *Financial management*, 101-112.
- Ilyas, M., and Jan, S. (2017). Corporate governance and cost of capital: Evidence from Pakistan. *Global Management Journal for Academic & Corporate Studies*, 7(2), 10-21.
- Jensen, M. C. and Meckling, W. H. (1976). "Theory of The Firm: Managerial Behavior, Agency Costs and Ownership Structure", *Journal of Financial Economics*, 3(4), 305-360.
- Julizaerma, M. K. and Sori, Z. M. (2012). "Gender Diversity in The Boardroom and Firm Performance of Malaysian Public Listed Companies", *Procedia-Social and Behavioral Sciences*, 65, 1077-1085.
- Karayel, M. and Doğan, M. (2014). "Yönetim Kurulunda Cinsiyet Çeşitliliği ve Finansal Performans İlişkisi: BİST 100 Firmalarında Bir Araştırma", *Süleyman Demirel Üniversitesi, İİBF Dergisi*, 19(2), 75-88.
- Kaya, F. (2015). *Finansal Yönetim*. Beta Yayınları.
- Klein, A. (2002). Audit committee, board of director characteristics, and earnings management. *Journal of accounting and economics*, 33(3), 375-400.
- Kirkpatrick, G. (2009). "The Corporate Governance Lessons from The Financial Crisis", *OECD Journal: Financial Market Trends*, 2009(1), 61-87.

- Khan, M. Y. (2016). Corporate governance and cost of capital: evidence from Pakistani listed firms (Doctoral dissertation, University of Glasgow).
- Khatab, H., Masood, M., Zaman, K., Saleem, S., and Saeed, B. (2011). Corporate governance and firm performance: A case study of Karachi stock market. *International Journal of Trade, Economics and Finance*, 2(1), 39.
- Kholeif, A. (2008). CEO duality and accounting-based performance in Egyptian listed companies: A re-examination of agency theory predictions. *Research in Accounting in Emerging Economies*, 8, 65-98.
- Kuğu, T. D. and Kırılı, M. (2013). "Ekonomik Katma Değer (Eva[®]) Ölçütünün Sermaye Yapısı ile İlişkilendirilmesi: İMKB'de Bir Uygulama", *Kahramanmaraş Sütçü İmam Üniversitesi, İİBF Dergisi*, 3(1): 171-180.
- La Porta, R. L., Lopez-de-Silanes, F., Vishny, R. and Shleifer, A. (2002). "Investor Protection and Corporate Valuation", *The Journal of Finance*, 57(3), 1147-1170.
- Lambert, R., Leuz, C., and Verrecchia, R. E. (2007). Accounting information, disclosure, and the cost of capital. *Journal of accounting research*, 45(2), 385-420.
- Lee, D. E. and Tompkins, J. G. (1999). "A Modified Version of The Lewellen and Badrinath Measure of Tobin's Q", *Financial Management*, 28(1), 20.
- Lewellen, W. G. and Badrinath, S. G. (1997). "On The Measurement of Tobin's Q", *Journal of Financial Economics*, 44(1), 77-122.
- Lewellen, J. and Katharina L. (2018). "Institutional Investors and Corporate Governance: The Incentive to Be Engaged", *Tuck School of Business Working Paper*, Working paper, No: 3265761.
- Lindenberg, E. B. and Ross, S. A. (1981). "Tobin's q Ratio and Industrial Organization", *The Journal of Business*, 54(1), 1-32.
- Maher, M. E. and Andersson, T. (2000). "Corporate Governance: Effects on Firm Performance and Economic Growth", *SSRN Electronic Journal*, <http://doi.org/10.2139/ssrn.218490>, Erişim Tarihi: 11.04.2019.
- Marashdeh, Z. M. S. (2014). The Effect of Corporate Governance on Firm Performance in Jordan. University of Central Lancashire, Phd Thesis, Lancashire, UK.
- Mehran, H. (2003). "Corporate Governance: What Do We Know, and What Is Different About Banks", *Federal Reserve Bank of New York Economic Policy Review*, 9(1), 1-3.
- Mohd, K. N. T., Latif, R. A., Kamardin, H., and Adam, N. C. (2016). The effect of busy directors, CEO duality and ownership on firm performance. *International Information Institute (Tokyo). Information*, 19(8A), 3149.
- Ntim, C. G., and Soobaroyen, T. (2013). Corporate governance and performance in socially responsible corporations: New empirical insights from a Neo-Institutional framework. *Corporate Governance: An International Review*, 21(5), 468-494.
- Oman, C. P. (2001). "Corporate Governance and National Development", *OECD Development Centre, Technical Papers No. 180*, 46.
- Oxelheim, L., and Randøy, T. (2003). The impact of foreign board membership on firm value. *Journal of Banking & Finance*, 27(12), 2369-2392.
- Özsöz, E., Gurarda, S., and Ates, A. (2014). Ownership Structure and Corporate Governance in the Case of Turkey.
- Öztürk, M. B. and Demirgüneş, K. (2008). "Kurumsal Yönetim Bakış Açısıyla Entellektüel Sermaye", *Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü Dergisi*, 19, 395-411.
- Parigi, B. M., Pelizzon, L., and von Thadden, E. L. (2015). A corporate governance asset pricing model: Theory and evidence.
- Peni, E., Vähämaa, S., (2010). Female executives and earnings management. *Managerial Finance* 36, 629-645.

- Potter, G. (1992). "Accounting earnings announcements, institutional investor concentration, and common stock returns." *Journal of Accounting Research* 30, 146-155.
- Piot, C. and F. Missonier-Piera (2007). "Corporate Governance, Audit Quality and The Cost of Debt Financing of French Listed Companies", https://www.academia.edu/30151042/Corporate_governance_audit_quality_and_the_cost_of_debt_financing_of_French_listed_companies, Erişim Tarihi: 25.03.2019.
- Rad, S. A. (2014). *The Relationship Between Corporate Governance Practices and Cost of Capital in Large Listed Companies of New Zealand and Singapore*. The University of Waikato, Phd Thesis, New Zealand.
- Regalli, M. and Soana, M.-G. (2012). "Corporate Governance Quality and Cost of Equity in Financial Companies", *International Journal of Business Administration*, 3(2), 2.
- Sagala, G. (2003). *The Relationship Between Cost of Capital and Leverage for Companies Quoted on The Nairobi Stock Exchange*. The University of Nairobi, Phd Thesis, Kenya.
- Sarkar, J. and Sarkar, S. (2018) Bank Ownership, Board Characteristics and Performance: Evidence from Commercial Banks in India. *International Journal of Financial Studies*, 6, 17.
- Shah, S. Z. A., Butt, S. A. and Hasan, A. (2009). "Corporate Governance and Earnings Management an Empirical Evidence form Pakistani Listed Companies", *European Journal of Scientific Research*, 26(4), 624-638.
- Sharfman, M. P., and Fernando, C. S. (2008). Environmental risk management and the cost of capital. *Strategic management journal*, 29(6), 569-592.
- Shrader, C. B., Blackburn, V. B., and Iles, P. (1997). Women in management and firm financial performance: An exploratory study. *Journal of managerial issues*, 355-372.
- Sias, R. (1996). "Volatility and the institutional investor." *Financial Analysts Journal* 52, 13-20.
- Singh, S., Tabassum, N., Darwish, T. K., and Batsakis, G. (2018). Corporate governance and Tobin's Q as a measure of organizational performance. *British Journal of Management*, 29(1), 171-190.
- Singhal, A. (2014). "Corporate Governance, Cost of Capital and Value Creation: Evidence from Indian Firms", *IOSR Journal of Economics and Finance*, 4(6), 36-54.
- Städtler, L. (2016). *The effect of gender diversification in the board on a firm's cost of capital*, Uppsala University, Disciplinary Domain of Humanities and Social Sciences, Faculty of Social Sciences, Department of Business Studies, Degree of Master.
- Solomon, J. (2010). *Corporate Governance and Accountability*. (3th Edition). Hoboken, New Jersey: John Wiley. http://www.123library.org/book_details/?id=5728, Erişim Tarihi: 25.12.2018.
- Suryanto, T., Thalassinou, E. J., and Thalassinou, I. E. (2017). Board Characteristics, Audit Committee and Audit Quality: The Case of Indonesia. *International Journal of Economics & Business Administration*, 5(3), 47-57.
- Sulong, Z., and Nor, F. M. (2010). Corporate governance mechanisms and firm valuation in Malaysian listed firms: A panel data analysis. *Journal of Modern Accounting and Auditing*, 6(1), 1.
- Şenol, Z. and Ulutaş, A. (2018). "Muhasebe Temelli Performans Ölçümleri ile Piyasa Temelli Performans Ölçümlerinin CRITIC ve ARAS Yöntemleriyle Değerlendirilmesi", *Finans Politik ve Ekonomik Yorumlar*, 641, 82-102.
- Taufil-Mohd, K. N., Md-Rus, R., and Musallam, S. R. (2013). The effect of ownership structure on firm performance in Malaysia. *International Journal of Finance and Accounting*, 2(2), 75-81.
- Tecer, M. (1980). *İşletmelerde Sermaye Maliyeti*. Türkiye ve Orta Doğu Amme İdaresi Enstitüsü Yayınları, No: 188.
- Tosuni, G. (2013). *The Impact of Corporate Governance on The Performance of Financial Institutions*. Staffordshire University, Phd Thesis, UK.
- Titova, Y. (2016). *Are board characteristics relevant for banking efficiency? Evidence from the US*. *Corporate Governance*.

- Usman, M., Farooq, M. U., Zhang, J., Makki, M. A. M., and Khan, M. K. (2019). Female directors and the cost of debt: does gender diversity in the boardroom matter to lenders?. *Managerial Auditing Journal*.
- Uzkaralar, Ö. (2017). *Kurumsal Yönetim ve Sermaye Maliyeti*. Ankara: Akademisyen Kitabevi.
- Weisbach, M. S. (1988). Outside directors and CEO turnover. *Journal of financial Economics*, 20, 431-460.
- Vernimmen, P., Quiry, P., Dalocchio, M., Le Fur, Y. and Salvi, A. (Ed.). (2009). *Corporate Finance: Theory and Practice*. (2nd Edition). Chichester: John Wiley.
- Veklenko, K. (2016). "The Impact of Board Composition on The Firm's Performance in Continental Europe", 7th IBA Bachelor Thesis Conference, July 1st, Enschede, The Netherlands.
- Vintilă, G. and Păunescu, R. A. (2016). "Empirical Analysis of The Connection Between Financial Performance and Corporate Governance within Technology Companies Listed on NASDAQ Stock Exchange", *Journal of Financial Studies and Research*, 2016 (2016), 1-20.
- Zhu, F. (2014). "Corporate Governance and The Cost of Capital: An International Study", *International Review of Finance*, 14(3), 393-429.
- Qubbaja, A. A. (2018). Impact of Corporate Governance Quality on the Cost of Equity Capital: Evidence from Palestinian Firms. *Research Journal of Finance and Accounting*, 9(8), 151-159.

Appendix

Codes	Variable Name	Calculation Method	Source
<i>Dependent Variables</i>			
WACC	Weighted Average Cost Of Capital	$(\text{Debt Weight} \times \text{Cost of Debt}) * (1 - \text{Tax Ratio}) + (\text{Weight of Equity} \times \text{Cost of Equity})$	Calculated with data from Finnet.
TOBINQ	Tobin Q	$(\text{Equity Market Value} + \text{Book Value of Liabilities}) / \text{Total Assets Book Value}$	Calculated with data from Finnet.
<i>Independent variables</i>			
BOARD	Board Size	Logarithm of the total number of board members within one year	Annual activity reports of companies
WOMEN	Women Managers on the Board of Directors	The ratio of the total number of women board members to the total number of board members within a year	Annual activity reports of companies
FOR	Foreign Managers in the Board of Directors	The ratio of the total number of foreign board members to the total number of board members within a year	Annual activity reports of companies
IND	Independent Members of the Board of Directors	The ratio of the total number of independent board members to the total number of board members within a year	Annual activity reports of companies
CEO	CEO Duality	The general manager is also defined as 1 if the chairperson of the board of directors, and 0 if not.	Annual activity reports of companies
BUSY	Chairperson's Busy	The chairperson of the board of directors has been defined as 1 if s/he has 3 or more positions and 0 if not.	Annual activity reports of companies
OWN	Institutional Investor Ownership	Number of Shares of Institutional Investors / Total Number of Shares	Annual activity reports of companies
<i>Control Variable</i>			
SD	Standard Deviation of Stock Returns	Standard deviation of weekly stock returns for each calendar year	Calculated with data from Finnet.
LEV	Leverage Ratio	Total Debt / Total Asset	Calculated with data from Finnet.

THE NEXUS BETWEEN COMMODITY TERMS AND NATIONAL TERMS OF TRADE OF SUB-SAHARA AFRICAN COUNTRIES: IMPLICATION FOR INTERSECTORAL LINKAGE

ANU KESHIRO TORIOLA^{a*}
EMMANUEL OLADAPO GEORGE^b
WALID GBADEBO ADEBOSIN^c

^{a,b}Olabisi Onabanjo University, Ago-Iwoye, Nigeria
^cCollege of Primary Education, Noforija, Epe, Lagos

Abstract

This study investigates the relationship between national terms of trade (price of export relative to import) and commodity terms of trade (price of primary commodity relative to manufactured goods) using data on forty-eight (48) Sub-Sahara Africa (SSA) countries. Data sourced from the International Monetary Fund (IMF) database and World Bank (WB) Development Indicator (WDI) was estimated via panel autoregressive distributed lag (panel-ARDL). The result provides evidence of a stable positive long-run relationship between commodity terms of trade and terms of trade of individual Sub-Sahara Africa countries. This implies that a decline in the relative price of primary commodity will result in a fall in aggregate terms of trade in the long run. The study submitted that commodity terms of trade is a useful indicator of the movement in the aggregate terms of trade of countries in Sub-Sahara Africa and the validity of Prebisch-Singer hypothesis (PSH). We recommend a big-push investment in the production and export of primary commodity since the trend in the terms of trade of primary commodity reflects the trend in the terms of trade of manufactured goods.

JEL Classification: P20, O41, C32

Keywords: Commodity terms of trade, National terms of trade, Prebisch-Singer Hypothesis, Panel-ARDL, Sub-Sahara Africa

*Corresponding Author: **Anu Keshiro TORIOLA**, Km 65, Shagamu-Ore Expressway, P.M.B, 2016, Ijebu-Itele, Ogun State, Nigeria. E-mail: toriolaanu@gmail.com

1. Introduction

Economies are composed of three basic sectors; the primary, secondary, and tertiary sector (Onakoya, 2014; Antai, Udo & Effiong, 2016; Akita & Hau, 2008). These sectors are interrelated and interdependent as reported in the literature (Chernyshev, 2018; Akita & Haiu, 2008; Subramaniam & Reed, 2009). To explain the linkage among the sectors, Macrae (1971) pointed out that the primary-agrarian- and secondary-industrial-based sector linkage emanates from the surplus produced in each sector in terms of labour, food, or investment finance, and available for exchange between sectors. According to the author, agriculture provides industry with food and raw materials, while industry, in return supplies its surplus of producer and consumer goods. Given the link between agriculture and industry, movement in the prices of agricultural produce is expected to have growth effect on the prices of non-agricultural produce, especially that of industry. According to Vittal (1986), this price relationship between agriculture and industry determines capital accumulation.

Generally, the terms of trade reflects price signals and economic incentives for producers and, hence, could be a determinant of supply response and growth performance of agriculture and the aggregate economy (Dholakia & Sapre, 2013). Accordingly, the issue as to whether reducing the price of agricultural to industrial, intersectoral terms of trade, which is the relative price of agricultural to industrial goods, can help extract a surplus from agriculture for industrialisation in the early stages of economic development has been crucial not only for centrally planned economies but also for developing countries that depend on agriculture (Fardmanesh, 2017). This issue led to two schools of thought in the literature. The first view argued for reduced agricultural prices relative to those for non-agricultural goods, based on the position that industrial accumulation has been hindered by rising farm prices, while the other line of thought argued for higher agricultural prices, based on the position that the non-agricultural sector of the economy has an unfair edge over the agricultural sector (Vittal, 1986). Meanwhile, whether reducing or increasing the agricultural terms of trade stimulates industrial capital accumulation depends on whether or not the terms of trade react to agricultural growth. According to de Souza (2014), development in agriculture will stimulate accumulation of capital in industry only if the fall in agricultural terms of trade dominates the increase in industrial wages in terms of food.

It has been assumed that the trend in commodity terms of trade CIT (price of primary commodity relative to manufactured goods) for primary commodity exporting developing countries generally reflects the trend in the aggregate terms of trade (price of export relative to import). However, the use of commodity terms of trade assumes that all developing countries export primary commodity and import manufacturing good in the same proportion. This might not be the case, especially for Sub-Sahara Africa countries, with relatively undiversified export across the range of primary products where only one or two commodities often account for the bulk of export

earnings (Cashin & Pattillo, 2006). According to Subramaniam and Reed (2009), export diversification varied, with some countries in Sub-Saharan Africa experiencing better success in the transition process. Consequently, the export baskets of many of these countries are likely to be related to aggregate price of primary commodity (price of export relative to import) rather than the widely used commodity terms of trade (price of primary commodity relative to manufactured goods). Furthermore, these countries' narrow production structures reduced the chances that Sub-Saharan Africa region import prices loosely follow the diversified manufacturing values series. In addition, since the primary commodity in the measurement of commodity terms of trade reflect the share of commodity-dependent Africa countries in world commodity exports and the manufacturing commodity that was used to deflate the price of primary commodity reflect the unit values of export of a group of industrial countries, commodity terms of trade may not be a good proxy for aggregate terms of trade of the countries in the region (Cashin & Pattillo, 2006).

In this study, our interest is to test whether there is a negative trend in the terms of trade of countries that are largely dependent on primary commodity exports by studying the relationship between commodity terms of trade and aggregate terms of trade of SSA countries to determine if the two series are actually negatively related in the long-run, as assumed in most studies that used commodity terms of trade, while neglecting the aggregate terms of trade to determine whether there is a negative trend in the terms of trade of primary commodity-dependent nations and for the validity of Prebisch-Singer hypothesis (PSH).

1.1 Problem Statement

In the Sub-Saharan Africa region, the process of structural transformation is slow and below that of other developing regions as many of the countries in the region still have large shares of their employment in agriculture, compared to the shares in industrial countries (Africa's Pulse, 2018). When compared with all other regions, Sub-Saharan Africa has the highest costs of export and the highest costs of import after Latin America and the Caribbean, based on border compliance, and South Asia, based on documentary compliance (UNCTAD, 2019). Consequently, growth in the region has decelerated from 2.5 per cent in 2017 to 2.3 per cent in 2018, below the rate of growth of the population for the fourth consecutive year, reflecting weaker exports from the region's large oil exporters (Nigeria & Angola), due to falling oil production amid high and volatile international crude oil prices, in addition to the deeper contraction in Sudanese economic activity and a slowdown among non-resource-intensive countries. During the period between 2018 and 2019, industrial commodity prices decline sharply. Even when the prices of other primary commodities stabilised, the trend in oil price remained dependent on the dictates of Organization of Petroleum Exporting Countries (Africa's Pulse, 2018).

In development economics literature, studies that tested whether there is a negative trend in the terms of trade of primary commodity-dependent nations and the validity of Prebisch-Singer hypothesis (PSH) are scarce. The few available studies not only produced mixed result but have also frequently used commodity terms of trade while neglecting aggregate terms of trade. This has been attributed to the widely held assumption that, for commodity exporting developing countries, the trend in each country's commodity terms of trade generally reflects the trend in the aggregate terms or net barter terms of trade, which may not hold. This is because a direct trend between the two terms of trade presupposes the existence of a stable long-run relationship between the two series (Cashin & Pattillo, 2006). Accordingly, the study of the relationship between commodity terms of trade and aggregate terms of trade is imperative.

In line with Cashin and Pattillo, (2006), this study addresses this gap by investigating the relationship between commodity terms of trade and aggregate terms of trade term in Sub-Sahara Africa to determine whether commodity terms of trade is a good proxy for the aggregate national terms of trade of individual SSA countries, as commonly used in the analysis of the implication of terms of trade on SSA. We improve on Cashin and Pattillo, (2006) by using a more recent dataset extended to cover the 2020s from 1995 to 2018. Also, we used both Levin-Lin-Chu and Fisher ADF unit root tests to determine the possibility of a cointegrating relationship among the variables. Subsequently, we applied autoregressive distributed lag ARDL approach, which can handle a mixture of stationary and non-stationary data to investigate the long-run relationship between the two series. The analysis helps to determine if it will be desirable for SSA countries to encourage diversification of their exports in favour of manufacturing goods (World Bank, 2000). The study also contributes to the literature focusing on the implication of sectoral decline in the trend of commodity terms of trade (CTT) on output and growth in SSA.

1.2 Objective and Significance of the Study

The aim of this investigation is to study the relationship between the commodity terms of trade and aggregate terms of trade in Sub-Sahara Africa. The specific objectives are to:

- a. examine the relationship between the commodity terms of trade and the aggregate terms of trade of SSA countries,
- b. examine the relationship between price of oil and the aggregate terms of trade of SSA countries.

The study, in line with Cashin and Pattillo, (2006) tested the validity of Lutz's (1999) argument of a long-run negative trend in the prices of primary commodity relative to those of manufacturing product (Prebisch-Singer hypothesis). That is, whether there is a negative trend in commodity terms of trade of countries

largely dependent on primary commodity exports. This negative trend is tested by examining the relationship between commodity terms of trade and aggregate terms of trade of SSA countries to determine whether the two series are negatively related in the long run. Since most SSA countries continued to rely on primary commodity, while many other developing countries now export larger share of manufacturing, a stable relationship is expected between the two terms of trade. The study is particularly important for African countries, which have become increasingly dependent on primary commodity exports with evidence of sectoral decline in net barter terms of trade. The study would also provide useful information that can be used to determine the impact of various trade policies aimed to diversify export, in line with trade policy adopted by respective countries.

This study is structured in four sections. Section one, introduction, was tailored on the background of the study, the research problem statement, the objective, and significance of the study. Section two focused on literature review, clarifies concepts and presents the review of existing literature and theories. Section three on methodology focused on model specification, data sources and measurement. Finally, section four is on results, discussion, and recommendations.

2. Literature Review

In this section, we clarify concepts and present the review of existing relevant literature and theories.

2.1 Sectoral Composition and terms of trade

The three basic sectors of an economy are the primary, secondary, and tertiary ones (Antai, Udo & Effiong, 2016; Akita & Hau, 2008). According to Akita and Hau, (2008), the primary sector includes agriculture and mining, the secondary sector refers to all industries and is, thus, interchangeably used with manufacturing sector, while the tertiary sector consists of all service activities, including construction. In the view of Antai, Udo and Effiong (2016), the primary sector comprises of agriculture, mining, and quarrying, inclusive of oil and gas. The service sector, otherwise known as the tertiary sector, consists of the activities where knowledge and know-how of people are offered for improve productivity and performance. This sector provides intangible goods, which include attention, advice, access, experience, and discussion (Onakoya, 2014).

Studies agreed that as an economy grows, labour gravitates from the agricultural to industrial sector, and then more of the labour force shift to the service sector (Onakoya, 2014; Africa's Pulse, 2019). This movement of labour from low to high-productivity sectors in an economy is referred to as structural shift, transformation, or change (Ajakaiye, Jerome, Nabena & Alaba, 2016). According to Jedwab, Gollin and Vollrath (2013), structural transformation is the transition of a

country from low productivity, labour-intensive sector to higher productivity, skill-intensive sector. The transition of an economy from agricultural to industrial sector and then, finally, to service economy has been recognised in the literature as the main determinant of economic progress of a nation (OECD, 2008; Onakoya, 2014). Service economy is characterised by sustained higher proportion of service components in intermediate inputs (OECD, 2000). In service economy, there is a rise in the proportion of service inputs in agriculture, production, employment, consumption, and trade (Onakoya, 2014).

Terms of trade emanates from foreign trade and has acquired added emphasis in the context of relations between rich and less-developed nations (LDCs) (Vittal, 1986). Terms of trade reflects the price incentives producers in the respective sectors faced, determining their investments, savings, and competitiveness (Dholakia & Sapre, 2013). In literature, there are different types and measures of terms of trade. According to Cashin and Pattillo (2006), commodity terms of trade reflects price of primary commodity relative to manufactured goods, while the aggregate terms of trade or the net barter terms of trade is the ratio of price index of exports of goods to imports of goods. Khusro (1961) defined the net barter terms of trade as the price ratio of commodity exported from and imported into the agricultural sector.

2.2 Theoretical Background

There are many theories providing the basis for explaining the relationship between terms of trade, sectoral growth, and aggregate productivity. These theories include the three-sector hypothesis, circular cumulative causation theory, cost-disease hypothesis, and Kuznets model.

2.2.1 The three-sector hypothesis by Clark (1940)

Fisher (1935) and Clark (1940) were two British economists that introduced the three-sector model. The model was later expanded by Fourastié, a French Economists in 1949. The three-sector hypothesis divides the economy into three sectors of activity: primary (extraction of raw materials), secondary (manufacturing) and tertiary (services) (Onakoya, 2014). The foundation of Clarks' three-sector hypothesis was based on Petty's idea of labour drift from agricultural to non-agricultural sector, often referred to as Petty's Law. The law states that "There is more to be gained by manufacture than by husbandry, and by merchandise than by manufacture" (Hospers & Steenge, 2002). According to the hypothesis, sectoral shift is mainly driven by rising income and elasticity of demand. That is, on a low-income level the demand for goods is relatively inelastic and focused on satisfying basic needs.

The theory described and predicted sectoral structural change in a national economy, where, at low level of development, the economy is dominated by the primary sector (agriculture), later the secondary sector (industrial production)

and, as the final achievement, by the tertiary sector (services) (Klodt, 2014). Along this path, agriculture first, followed by industry, will reach a peak level of relative employment over time. After reaching the tipping point of relative employment, the national share of employees in manufacturing will be shrinking. This is notwithstanding the fact that in the case of rising productivity, reduced employment does not necessarily go along with reduced output. In line with societal development over time, the tipping point at which deindustrialisation starts should be related to a certain income per capita. Thus, on the path of development, services become increasingly more favoured (Przywara, 2016).

2.2.2 Baumol's Cost-Disease Hypothesis (1967, 2001)

Baumol (1967), cited in Costa (2019), distinguished two sectors of an economy: the technologically progressive and technologically non-progressive sectors. These sectors are distinct as the latter is more labour-intensive than the former (Costa, 2019). In the technologically non-progressive sector, output is demand driven by the rise of productivity since workers are also consumers and their wages increase with productivity in the technologically progressive sector.

According to the hypothesis, the cost of labour is higher in the technologically non-progressive sector because, even though there is more input (labour), productivity is not growing as fast as in the manufacturing sector. To support the extra labour needed, there must be a larger share of GDP allocated to the technologically non-progressive sector to cover increasing relative costs in the sector (Costa, 2019). Therefore, the technologically non-progressive sector will require that a higher share of labour is allocated to it, which means that its relative cost of labour will increase. This implies that the relative cost of labour will increase in the non-progressive sector when wages increase, given that productivity remains constant in this sector. Therefore, cost disease affects stagnant sectors the most when the difference between wage growth and productivity growth is higher. In fact, cost disease may affect the economy even more because the share of non-progressive industries is increasing (Nordhaus, 2008).

In most developed countries, there has been an increase in the share of labour allocated to services sector – technologically non-progressive sector leaving a smaller share allocated to more progressive sectors (Colombier, 2017). According to Baumol (1993), some of the services are still demanded when its price increases, which means they are price inelastic. However, for this to happen, productivity needs to be at a 'normal/good' level, otherwise demand for it will disappear.

2.2.3 Circular Cumulative Causation (CCC) Theory by Myrdal (1957)

Myrdal (1957) developed CCC theory as a critique of stable equilibrium and the stability generally assumed in neo-classical economics. The theory of circular

cumulative causation (CCC) formulated by Myrdal (1957) treats the elements of social and economic processes as highly interrelated, so that the deterioration of one element necessarily influences other elements (Hirvilammi, 2019). Myrdal also made clear that this approach includes value premises that can only justify the desirable and possible features of the system. Myrdal, thus, paid attention to cumulative causes, causal chains, and path dependencies (Pierson, 2004). Myrdal (1957) argued that there is no tendency that would automatically stabilise the social system; rather, the contrary is true. If a change occurs, it accelerates supporting rather than countervailing changes, which shift the whole system in the same direction as the initial change, only much faster. Myrdal favoured the values of democratic equality, as clearly reflected in his concern about the vicious circle of increasing international inequalities (Berger, 2008). According to Myrdal, social change emerges in a process of reciprocal interaction between different elements in society (Hirvilammi, 2019).

In sum, for Kaldor, Myrdal's cycle of cumulative causation is that demand and output growth fuel productivity growth due to increasing returns to scale, which, in turn, fuels capital accumulation (Schlogl and Sumner, 2020). The investment in and location of a new manufacturing factory may ignite more employment in the factory and indeed generate more ancillary jobs and service industries in the area. Verdoorn's argument was one of cumulative causation where demand, rather than supply, determines the rate of accumulation (Hirvilammi, 2019). According to Onakoya, (2014), the circular cumulative causation theory believed that growth, by itself, can transform an economy. According to Myrdal (1957), the social process of circular causation "tends to become cumulative and often to gather speed at an accelerating rate". When defining economic and structural changes, Myrdal (1957) argued that there is no tendency that would automatically stabilise social system; rather, the contrary is true.

2.2.4 Kuznets Model

Kuznets (1955) model, as cited in Baymul and Sen, (2013) opined that, during the early stage of economic development, inequality will increase but, at a later stage, inequality may fall through the government's redistributive policies combining progressive taxation with welfare spending. The Kuznets process of structural transformation with widening inequality is made up of two sub-processes: the movement of the population from a sector characterised by lower mean income to a sector characterised by higher mean income, and the movement of the population from a sector with low within-sector inequality to a sector with higher within-sector inequality. If both sub-processes work in the same direction -that is, if workers move from a sector with both a low mean and low variance income to a sector with a higher mean and high variance income- then structural transformation will unambiguously increase inequality. However, if the movement of workers is from a

sector with a low mean but higher variance income to a sector with a higher mean but lower variance income, then it is less obvious that inequality will necessarily increase (Baymul and Sen, 2013). In Kuznets' view, the sector where workers are moving out of is clearly agriculture. However, the sector that is absorbing labour is not clarified in the 1955 paper, but the sector is quite likely to be industry and it could also be services.

Whether the Kuznets process holds for any particular economy depends on the specific characteristics of the path of structural transformation the economy follows. For example, are workers moving from an agricultural sector that has high land inequality or is the agricultural sector in this economy characterised by more equal land distribution, or is the movement of workers to sector with relatively low mean incomes, such as low-productivity services, or to sector with high within-sector inequality, such as mining or capital-intensive manufacturing? (Baymul & Sen, 2013). Kuznets (1968), as cited in Baymul and Sen, (2013) also observed that, for a successful development strategy, technological advancement must support both industrialisation and improvements in agricultural productivity. Recognising that economic growth is (not) just a matter of easy transfer of labour from subsistence agriculture to progressive industry; Kuznets emphasised the increase in agricultural productivity as an indispensable base of modern economic growth (Saikia, 2009).

2.3 Empirical Studies

Several studies that tested whether there is a negative trend in the terms of trade of primary commodity-dependent nations and the validity of Prebisch-Singer hypothesis (PSH) have frequently used commodity terms of trade while neglecting the aggregate terms of trade. For instance, Grilli and Yang (1988) reported that from 1988 to 1986 the relative prices of all primary commodities fell on trend by 0.5 per cent a year, while the price of non-fuel primary commodities fell by 0.6 per cent a year. The study corroborates the negative signs, but not the magnitude of the trend in Prebisch's work. They envisaged that some limited sectoral decline shown by their relative price indexes may be magnified by an incomplete account of quality improvements in manufacturing. The study also indicates that, despite the decline that has probably occurred during the current century in the terms of trade of non-fuel primary commodities, the purchasing power of total exports of these products has considerably increased. Similarly, the fall that may have occurred after World War II in the net barter terms of trade of developing countries seems to have been more than compensated for by the steady improvement in income terms of trade.

In the same vein, Aslan and Nazlioglu (2018) reported partial support for the Prebich-Singer hypothesis since only 7 out of 24 commodities studied display negative trend. The objective of the study was to investigate whether shocks to real

international commodity prices are transitory or permanent based on sequential panel selection model. Similar result was established by McGregor, Sartorello and Verspagen (2018) using the “World Bank’s Global Economic Monitor, Commodities” on data covering the period of 1960 to 2015 for 52 different commodities, while utilising panel error correction models, to examine the short- and long-term effects of international commodity prices on output per capita. The study shows evidence of a long-term negative impact of commodity prices on per capita GDP but the effect tends to be limited to energy, with the effects of rising non-energy commodity prices tending to have a positive long-term impact on per capita GDP. The short-term effect of commodity price growth on per capita GDP growth was positive. In addition, Ogundipe, Adu, Ogundipe and Asaleye (2019) reported similar result that the share of agriculture in primary commodity exports has consistently remained below 3 per cent since the advent of crude oil. The study assessed the macroeconomic impact of agricultural commodity price volatility in Nigeria from 1970 to 2017 using Autoregressive Distributive Lag (ARDL) cointegration and Impulse-Response Function (IRF) analysis. It was also found that volatile agricultural prices were responsible for a meagre 2 per cent of macroeconomic fluctuations. Furthermore, the study found that swings in agricultural prices affect foreign reserves and inflation and is more significant and appears earlier in the time horizon than other macroeconomic aggregates.

In the same vein, Olakojo (2015) provides evidence of a significant positive effect of primary commodity export prices on economic growth in selected African countries in the long run. The analysis was based on 24 primary commodity-based African economies using pooled mean group (PMG) heterogeneous panel data. The study also revealed that the adjustment of African economies to long-run equilibrium, when there is short-run disequilibrium, is weak, which implies that there is low level of diversification among many African economies and a limitation for manoeuvring in cases where commodity prices crash. Similar result was reported in the study conducted by Cashin, and Pattillo (2006) on the analysis of the relationship between African terms of trade and commodity terms of trade; little support was found for a stable, long-run relationship between commodity terms of trade and national terms of trade.

Similarly, Witkowska (2016) discussed if the observed trends in long-term price developments, as well as the primary commodity terms of trade of the most important primary commodity, can provide a confirmation of the Prebisch-Singer Hypothesis. The study presumed that the idea of the Prebisch-Singer Hypothesis can be used to provide explanation for the diverging terms of trade development of industrialised countries with different export structures. The study indicate that the possible cause lies in the differing specialisation of specific export sectors of these countries and the corresponding price developments of the goods exported.

In another study, Ingram (2014) reported that during commodity price booms, the faster growth occurs towards the end of the boom. Likewise, most price collapses occur towards the end of slumps. The study introduced a new approach to the analysis of the cyclical behaviour of world commodity prices based on a novel way to conceptualise shocks to commodity prices, such as cyclical occurrence; besides, based on the newly established empirical regularity, the size of cyclical shocks act as a leading indicator of impending turning points. The study also reported that, within booms and slumps, the behaviour of commodity prices seems to be quite similar, surprisingly even among different types of commodities (soft and hard), which are influenced by different shocks. Also, Miečinskienė and Lapinskaitė (2014) find that variation in general price level in Lithuania depends on changes of commodity prices in world commodity exchanges, affected mainly by the prices of aluminum, cocoa, coal, and oil. Their studies examine the effect of changes in commodity price level in the world commodity exchanges on the variation of general price level index in Lithuania based on correlation regression analysis.

2.4 Stylised Facts

Table 1 classified Sub-Sahara countries into three sectors, namely: top, middle, and bottom terciles as a threshold of resilient growth based on domestic growth performance across 44 Sub-Sahara African countries.

Table 1. Structural Transformation in Sub-Sahara Africa across Growth Performance Terciles (average shares, unweighted)

	Bottom		Middle		Top	
	1995-08	2015-18	1995-08	2015-18	1995-08	2015-18
Value-added shares (%)						
Agriculture	21.5	17.6	26.9	22.9	31.9	28.8
Industry	31.4	27.8	20.0	19.0	19.4	21.5
Services	42.2	49.0	47.5	48.9	41.8	43.2
Employment Share (%)						
Agriculture	56.8	51.3	60.2	55.4	65.5	56.6
Industry	12.2	13.2	12.5	12.4	8.9	11.9
Services	31.0	35.5	27.3	32.2	25.5	31.5

Source: Africa's Pulse, 2019.

The shift in the data in Table 1 captures the trend of structural transformation in the region. In the bottom tercile there are countries whose economic performance declined from 1995-2008 to 2015-18; in middle tercile are countries whose growth rate remained invariant over time, between 3.5 per cent and 5.4 per cent, in both periods, while countries in the top tercile have improved economic performance with growth of exceeding 5.4 per cent per year in both periods (Africa's Pulse, 2019).

Table 1.1 above shows that the average value-added share in agriculture is the smallest in the bottom tercile (17.6 per cent in 2015-2018), while it is the largest in the top tercile (28.8 per cent in 2015-18). Although the value-added share in agriculture declined for all terciles (bottom, middle, and top) from 1995-2008 to 2015-18, the largest drop took place in the bottom and middle terciles (with an average decline of about 4 per cent), while the smallest drop happened in the top tercile (with an average drop of 3.1 per cent). The table also shows that agricultural employment shares fall across all terciles in the region from 1995-2008 to 2015-18, and workers drift from primary to services and, to a lesser extent, the industry sector.

It is evident, first and foremost, that there is linkage among the various sectors in Sub-Sahara Africa countries given the movement of workers from one sector to another. Secondly, it is evident that these countries have experienced structural transformation from agriculture to services and, to a lesser extent, the industry sector. The fall in agricultural value added across all terciles is a confirmation of structural shift to the service economy and a pointer of premature de-industrialisation in the region, since the bulk of the region excess labour is currently absorbed in non-tradable services operating at very low levels of productivity in activities such as retail trade and housework (Rodrik, 2014). The movement has so far not delivered rapid growth to the level of the region growth potential. Accordingly, it is now an empirical question whether a service-led model can deliver rapid growth and good jobs in Africa as experienced under the manufacturing-led model.

3. Research Methodology

The study used data on forty-eight (48) Sub-Sahara Africa countries as enlisted in the World Bank 2019 data on Sub-Sahara Africa published online. The justifications for our choice of Sub-Sahara Africa as a case in study is the unequal distribution of the benefit of the transition process among countries in the region; while some countries experienced better success in the transition process than others (Subramaniam & Reed, 2009), the transition process in the region is slow and also lags behind developing regions, as such many of these countries still have large shares of employment in agriculture, compared to the shares in industrial countries (Africa's Pulse, 2019). Also, the study of the region offers the opportunity to contribute to the ongoing debate on premature de-industrialisation of Africa.

The data covers twenty-four (24) years from 1995 to 2018. The scope of the study covers the same period used by Africa’s Pulse, (2019) in the analysis of structural transformation in Sub-Sahara Africa across the growth performance terciles. The period captured the structural transformation pattern of the region in terms of labour movement from one sector to another. Accordingly, there are forty-eight (48) cross-sectional units (nations) and twenty-four (24) years with 1152 total observations in the study. Data was collected from World Bank, World Development Indicator (WDI) and International Monetary Fund (IMF). Table 3.1 shows the description, sources, and unit of measurement of the data used.

Table 2. Data Description, Unit and Sources

SN	Variables	Description Symbol	Operational Definition	Measurement unit	Sources
1	National terms of trade	ATT	Price index of exports of goods divided by imports of goods. It proxies windfall gains and losses of income associated with changes in world prices.	Fixed Weights Index (2012 = 100)	IMF 2019
2	Commodity terms of trade	CTT	Proxy by Net barter terms of trade index calculated as the price of primary commodity relative to the price of manufactured product, measured relative to the base year 2000	Index 2000 = 100	World Bank, 2019 Database (WDI)
3	Real price of oil	ROIL	Measured by the nominal price of oil (SUS) deflated by the price of manufacturing goods	Index Base Year = 2000	IMF 2019

Source: Authors’ Compilation, 2020

In order to analyse the relationship between the commodity terms of trade and the aggregate terms from 1995 to 2018, the study adopted the model used in the study conducted by Cashin and Pattillo (2006) in their analysis of the relationship between African terms of trade and commodity terms of trade (net barter terms of trade), where the aggregate index of the terms of trade was the dependent variable, while commodity terms of trade (the price of primary commodities relative to the price of manufacturing) and the real price of oil (nominal price of oil deflated by the price of manufacturing) were the explanatory variables. The model is specified as follows:

$$ATT_t = f(CTT, ROIL_t) \tag{1}$$

ATT = Aggregate index of the terms of trade

CTT = Commodity terms of trade

ROIL= Real price of oil

The inclusion of the real price of oil is to capture the effect of oil price on terms of trade since our sample included both oil and non-oil-exporting primary commodity developing African countries. There is a need to capture the implication of oil export component on the movement of aggregate terms of trade. Based on a priori

expectations, it is expected that commodity terms of trade have long-run relationship with aggregate terms of trade. Also, oil price is expected to have negative effect on terms of trade since household purchasing power falls with rise in oil prices.

The model was analysed using the panel autoregressive distributed lag ARDL cointegration approach to investigate the long-run relationship among the variables against the Johansen and Juselius (1990) cointegration approach used by Cashin and Pattillo (2006). The ARDL model used in the study, in line with Pesaran, Shin and Smith (1999), is stated as follows:

$$ATT_{it} = \beta_0 + \sum_{j=1}^{p-1} \beta_1 ATT_{it-j} + \sum_{j=0}^{q-1} \beta_2 CTT_{it-j} + \sum_{i=0}^{q2} \beta_3 ROIL_{it-i} + \mu_{it}$$

This method was adopted because, when compared to other multivariate cointegration methods, such as the Johansen and Juselius (1990) cointegration approach, the ARDL approach allows the cointegration relationship to be estimated by OLS once the lag order of the model has been identified. Furthermore, by the application of this method, long run and short run parameters of the models can be simultaneously computed (Lawal, 2016). Finally, our choice of ARDL approach is because of its edge in handling a mixture of stationary and non-stationary data to other cointegration approach. The unit root was tested to determine the possibility of a cointegration relationship among the variables using both the Levin-Lin-Chu and Fisher ADF unit root tests. In the actual estimation of the model, the pooled mean group (PMG) and dynamic fixed effects (DFE) was used. The choice of the PMG is because it allows short-run estimates as well as intercepts, speed of adjustment to long-run equilibrium statistics and error variances that are heterogeneous on a country-by-country basis, while long-run slope coefficients are restricted to be homogeneous across countries, which is particularly useful when there are reasons to expect long-run convergence (Samargandi, Fidrmuc & Ghosh, 2014). The DFE was also used because it imposes restriction on slope coefficients and ensures error variance is equal across all countries in the long run. DFE also restricts the speed of adjustment coefficient and the short-run coefficient to ensure they are equal, too, but the model allows for country-specific intercepts (Samargandi, Fidrmuc & Ghosh, 2014).

4. Results and Discussion

In the analysis of the relationship between commodity terms of trade and aggregate terms, the study employed cointegration analysis after the stationarity test. The result of the cointegration analysis, informed our choice of the Panel-ARDL estimation approach.

4.1 Panel Unit Root Test

In the test for the unit root, we used Levin-Lin-Chu and Fisher ADF unit root tests. The test statistics are based on Newey-West automatic bandwidth selection and Bartlett kernel procedure of the three-time series are presented in Table 3.

Table 3. Panel Unit Root Test

Variables	Levin-Lin-Chu			Fisher ADF		
	Level	First Diff.	Order	Level	First Diff.	Order
ATT	-0.59359 (0.2764)	-28.7427 (0.0000)	I(1)	77.8244 (0.8860)	857.858 (0.0000)	I(1)
CTT	-3.74297 (0.0001)		I(0)	100.096 (0.2647)	794.836 (0.000)	I(1)
ROIL	12.9730 (1.0000)	-18.7214 (0.0000)	I(1)	11.6966 (1.0000)	482.050 (0.0000)	I(1)

Source: Author, 2020

The result in Table 3 based on Levin-Lin-Chu unit root test depicts that aggregate terms of trade and real price of oil are non-stationary at levels, while commodity terms of trade is stationary at levels. Using the Fisher ADF unit root test, all series were found to be non-stationary at level. However, there is controversy in the result of Levin-Lin-Chu and the Fisher ADF unit root tests: both results indicated the possibility of cointegration relationship among the series. Since ARDL approach is useful in analysing the relationship among non-stationary variables or that have mixture of stationarity; this informed our choice of panel ARDL approach in analysing the long-run relationships between commodity terms of trade and aggregate terms of trade to align the results of both test.

4.2 Panel ARDL

The results of the pooled mean group (PMG) and dynamic fixed effects (DFE) estimates of the relationship between commodity terms of trade and aggregate terms are reported in Table 4.

In the pooled mean group and dynamic fixed estimators, having dropped five cross-sectional units, it was found that commodity terms of trade exerts positive and significant impact on aggregate indices of the terms of trade in both the short and the long run. While the dynamic fixed estimate suggests a significant positive impact of oil price movement on aggregate terms of trade only in the long run, in the pooled mean group result its effect is not statistically significant in either the long run or short run at 5 per cent level of significance. The estimated coefficient

of commodity terms of trade in the long-run (0.241408) and short run (0.743794) implies that a 1 per cent increase in the commodity terms of trade is correlated with a 0.24 per cent and 0.74 per cent rise in the aggregate terms of trade in the long-run and short run, respectively, based on the pooled mean group result, while in the dynamic fixed effect estimates, the estimated coefficient of commodity terms of trade in the long-run (8.478742) and short run (6.404844) implies that a 1 per cent increase in the commodity terms of trade is correlated with a 847.8 per cent and 640 per cent increase in the aggregate terms of trade in the long-run and short run, respectively. The result suggests a stable positive long-run relationship between commodity terms of trade and terms of trade of individual Sub-Sahara African countries.

Table 4. Pooled Mean Group and Dynamic Fixed Effects Estimates

Variables	Pooled Mean Group			Dynamic Fixed Effects		
	Coefficients	t-Statistic	Prob.	Coefficients	t-Statistic	Prob.
Long-run						
CTT	0.241408***	11.34617	0.0000	0.226590***	8.478742	0.0000
ROIL	-3.97E-08	-0.638236	0.5235	1.24E-07***	2.742808	0.0062
Short run						
COINTEQ01	-0.285340***	-5.495088	0.0000	-0.192586***	-5.373712	0.0000
Δ (CTT)	0.743794***	5.981907	0.0000	0.674816***	6.404844	0.0000
Δ (ROIL)	1.50E-06*	1.912300	0.0563	1.56E-07	0.207382	0.8358
Intercept	25.52595	4.786573	0.0000	15.91233	4.483761	0.0000
No. of Countries	48			43		
Observations	1152			1032		
Hausman Test				44.3013 (0.0000)		

Note: Δ is first difference operator

Source: Authors, 2020

In order to measure efficiency and consistency among estimators, the Hausman test has been applied. The result validates long-run homogeneity restrictions across Sub-Sahara Africa countries, and, hence, efficiency of both estimators. The Hausman test results accept the null hypothesis of homogeneity restrictions on long run regressors, which indicates that both estimators are efficient. From the overall panel ARDL model, we found long run positive relationship between commodity terms of trade and aggregate indices of terms of trade.

5. Conclusion and Recommendations

This study investigates the relationship between national terms of trade (price of export relative to import) and commodity terms of trade (the price of primary commodity relative to manufactured goods) for commodity- dependent developing countries using data on forty-eight (48) Sub-Sahara Africa (SSA) countries. Data was sourced from the International Monetary Fund (IMF) database, and World Bank (WB) Development Indicator (WDI) was estimated using panel autoregressive distributed lag (panel-ARDL). The result shows that, expanding the sample period into the 2020s, there is evidence of a stable positive long-run relationship between commodity terms of trade and terms of trade of individual Sub-Sahara African countries. Therefore, commodity terms of trade is a good proxy of national terms of trade of SSA countries. This implies that a decline in the relative price of primary commodities will result in a fall in aggregate terms of trade in the long run. Therefore, commodity terms of trade is a useful indicator of general movement in the aggregate terms of trade of countries in Sub-Sahara Africa. As such, movement in commodity terms of trade reveals a lot of information about movements in the national terms of trade of individual countries. Our study corroborates the findings in the study conducted by Aslan and Nazlioglu (2018) that provide partial support for the Prebich-Singer hypothesis since only 7 out of the 24 commodities studied display negative trend. Our result is in contrast to the study conducted by Cashin and Pattillo (2006), which provides little support for a stable, long-run relationship between commodity terms of trade and national terms of trade.

The policy implication of the result justifies the desirability of a consistent big-push investment in production and export of primary commodity since the trend in the terms of trade of primary commodity reflects the trend in the terms of trade of manufactured goods. Therefore, the development of the agricultural sector has a desirable spill-over effect on the growth of other sector of the economies in the region and the region as a whole. By and large, our result supports Prebisch-Singer hypothesis (PSH), that favourable agricultural sector terms of trade translate to higher growth in agriculture and the economy as a whole.

References

- Africa's Pulse, (2019). Analysis of issues shaping Africa's economic future. World Bank, Washington, DC. doi: 10.1596/978-1-4648-1421-1. License: Creative Commons Attribution CC BY 3.0 IGO
- Ajakaiye, O., Jerome, A.T., Nabena, D., & Alaba, O.A (2016). Understanding the relationship between growth and employment in Nigeria, UNU-WIDER project on 'Macro-Economic Management (M-EM)'; University of Cape Town.
- Akita, T. & Hau, C.T.T (2008). Inter-sectoral interdependence and growth in Vietnam: A comparative analysis with Indonesia and Malaysia", *Journal of Applied Input-Output Analysis*, 13(14), 1-11.
- Antai, A.S., Udo, A.B., & Effiong, C.E (2016). Analysis of the sectoral linkages and growth prospects in the Nigerian economy. *Journal of Economics and Finance*. 7(6), 73-80 doi: 10.9790/5933-0706017380.

- Aslan, M. & Nazlioglu, S. (2018). Do international relative commodity prices support the Prebisch-singer hypothesis? a nonlinear panel unit root testing, *Romanian Journal of Economic Forecasting*, XXI(1), 76-92.
- Baumol, W.J. (1993). "Health care, education and the cost disease: A looming crisis for public choice." In *The Next Twenty-Five Years of Public Choice*, edited by Schneider F. Rowley C.K., 17-28. Springer, Dordrecht.
- Baumol, W.J. (1967). Macroeconomics of unbalanced growth: The anatomy of urban crisis. *The American Economic Review*, 57(3), 419-42.
- Baumol, W.J. (2001). Paradox of the Services: Exploding Costs, Persistent Demand, in T. ten Raa – R. Schettkat (eds.), *The Growth of Service Industries. The Paradox of Exploding Costs and Persistent Demand*, Edward Elgar, 2001.
- Baymul, C., & Sen, K. (2013). Kuznets Revisited: What do we know about the relationship between structural transformation and inequality? *Asian Development Review*, vol. 36, no. 1, pp. 136-167, https://doi.org/10.1162/adev_a_00126.
- Cashin, P., & Pattillo, C. (2006). African terms of trade and the commodity terms of trade: Close cousins or distant relatives? *Applied Economics*, 38, 845-859, doi: 10.1080/00036840600683244
- Chernyshev, N. (2018). From productivity shifts to economic growth: Intersectoral linkage as an amplifying factor. University of St Andrews Centre for Dynamic Microeconomic Analysis (CDMA) Working Paper Series No. 1801.
- Clark, C. (1940). The conditions of economic progress. *The Economic Journal*, 51(201), 120-124.
- Colombier, C. (2012). "Drivers of health care expenditure: Does Baumol's cost disease loom large?" FiFo Discussion Paper No. 12-5.
- Costa, S. (2019). Baumol's cost disease in the health care sector, Dissertation submitted in partial fulfilment of requirements for the MSc in Economics-major in Macroeconomic Policy, at the Universidade Católica Portuguesa.
- De Souza, J.P.A (2014). Growth complementarity between agriculture and industry: evidence from a panel of developing countries, University of Massachusetts Amherst, Department of Economics, Working Paper 2014-11.
- Dholakia, R.H. & Sapre, A.A. (2013). Inter-sectoral terms of trade and aggregate supply response in gujarat and Indian agriculture. Indian Institute of Management, W.P. No. 2013-07-02.
- Fardmanesh, M. (2017). Inter-sectoral terms of trade and investible surplus. Temple University, Economic Growth Center, Discussion Paper No. 1060. <http://www.econ.yale.edu/~egcenter>.
- Fisher, A.G (1935). Investment policy in a progressive economy. *Economic Record*, 10(1), 149-166
- Francois, J. & Woerz, J. (2007). Service sector linkages: The Role of services in manufacturing. *Proceedings of OeNB Workshops No. 14*.
- Grilli, E.R., & Yang, M.C. (1988). Primary commodity prices, manufactured goods prices, and the terms of trade of developing countries: What the long run shows, *The World Bank Economic Review*, 2(1): 1-47.
- Hirvilammi, T. (2019). The virtuous circle of sustainable welfare as a transformative policy idea, *Sustainability*, 12, 391; doi:10.3390/su12010391.
- Hospers GJ, Steenge AE (2002) Structural and institutional change in Europe: An Analysis inspired by Fourastié and Perroux. In Prinz A, Steenge A, Vogel A (eds) *Agglomeration, Population und Koordination in Europa*. Münster: LIT Verlag, 1-34.
- Ingram, S.R. (2014). Commodity price changes are concentrated at the end of the cycle, The University of Western Australia, Department of Economics Discussion Paper 14.20.
- Jedwab, R., Gollin, D., & Vollrath, D. (2013). Urbanization with and without Industrialization. Working Paper Series IIEP-WP 2014-1, Institute for International Economic Policy (IIEP), The George Washington University, Washington, D.C, Available from: www.gwu.edu/~iiep/assets/docs/papers/Jedwab_IIEPWP_2014-1.

- Johansen, S. & Juselius, K., (1990). Maximum likelihood estimation and inference on cointegration-with applications to the demand for money. *Oxford Bulletin of Economics and Statistics* 52(2), 169 -210.
- Khusro, A.M (1961). Inter-Sectoral terms of trade and price policy. *The Economic Weekly Annual*
- Klodt, H. (2014). Drei-Sektoren-Hypothese. Retrieved from <https://bit.ly/2RkJUjq>.
- Kuznets, S. (1955). Economic growth and income inequality. *The American Economic Review* 45(1), 1-28.
- Lawal, A.I., Nwanji T.I., Asaley A.J., & Ahmed V. (2016). Economic growth, financial debt and trade openness in Nigeria: An application of ARDL bound testing approach. *Cogent Economics and Finance* 4(1), 1-11.
- Lutz, M. (1999). Commodity terms of trade and individual countries' net barter terms of trade: is there an empirical relationship?, *Journal of International Development*, 11, 859-70.
- Macrae, J. (1971). The relationship between agricultural and industrial growth, with special reference to the development of the Punjab economy from 1950 to 1965, *The Journal of Development Studies*, 7(4), 397-422, doi: 10.1080/00220387108421378.
- McGregor, N.F., Sartorello, D. & Verspagen, B. (2018). On the development and impact of commodity prices and cycles. United Nations Industrial Development Organization, Department of Policy, Research and Statistics, Working Paper 08/2018.
- Miečinskienė, A., & Lapinskaitė, I. (2014). The Research on the Impact of the Changes of Commodity Price Level in the World Commodity Exchanges on Variation of General Price Level, *Economics and Sociology*, 7(4), 71-88 doi: 10.14254/2071-789X.2014/7-4/5.
- Myrdal, G. (1957). *Economic theory and under-developed regions*; Gerald Duckworth & Co.: London, UK, 1957.
- Nordhaus, W.D. (2008). Baumol's diseases: A macroeconomic perspective. *The B.E. Journal of Macroeconomics*, 8(Contributions), Article 9.
- OECD (2008). *Global Forum VII on International Investment: The contribution of services to development and the role of trade liberalisation and regulation*, ODI Briefing Notes, DFID, UK.
- Ogundipe, A.A., Adu, O., Ogundipe, O.O., & Asaley, A.J. (2019). Macroeconomic impact of agricultural commodity price volatility in Nigeria, *The Open Agriculture Journal*, 13, 162-174 doi: 10.2174/1874331501913010162.
- Olakojo, S.A. (2015). Export commodity prices and long-run growth of primary commodities-based African economies. *CSEA Working Paper WPS/15/02*.
- Onakoya, A.B. (2014). Service sector role in the context of inter-sectoral linkages: The case for economic Growth in Nigeria. *Ijagun Journal of Social and management Science*. 4(1), 1-14.
- Pesaran, M.H, Shin, Y. and Smith, R.P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of American Statistical Association*, 94(446), 621-634.
- Pierson, P. (2004). *Politics in time: History, institutions, and social analysis* 1st ed.; Princeton University Press: Princeton, NJ, USA, 2004.
- Przywara, R. (2019). The interrelation between manufacturing productivity, Maximum Sectoral employment and national income per capita, *Athens Journal of Business & Economics*, 5(2), 93-122 <https://doi.org/10.30958/ajbe.5-2-1>.
- Rodrik, D. (2014) When ideas Trump interests: Preferences. *Journal of Economic Perspectives* 28(1), 189-208.
- Saikia, D. (2009). Agriculture-industry interlinkages: Some theoretical and methodological issues in the Indian context, *Munich Personal RePEc Archive MPRA Paper No. 27820*, posted.
- Schlogl, L., & Sumner, A. (2020). Disrupted development and the future of inequality in the age of automation. *Rethinking International Development series*, Palgrave Macmillan, <https://doi.org/10.1007/978-3-030-30131-6>

- Subramaniam, V., & Reed, M. (2009). Agricultural inter-sectoral linkages and its contribution to economic growth in the transition countries. Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, August 16-22, 2009.
- Samargandi, N., Fidrmuc, J. & Ghosh, S. (2014). Is the relationship between financial development and economic growth monotonic? Evidence from a sample of middle income countries. CESifo Working Paper No. 4743.
- UNCTAD (2019). Economic development in Africa report 2019: Made in Africa: Rules of origin for enhanced intra-African trade. UNCTAD/PRESS/IN/2019/2/Rev.1, Geneva, Switzerland, (26 June 2019).
- Vittal, A. (1986). Intersectoral terms of trade in India: A study of concept and method, *Economic and Political Weekly*, 21(52), A147-A149+A151-A166 Published.
- Witkowska, E.A. (2016). Reconsideration of the Prebisch-Singer Hypothesis, *Real-world economics review*, 76(2).

guide for authors

The articles should be written as follows:

(1) Papers must be in English.

(2) Papers for publication (two copies) should be sent to:

Mrs. Melina Petromelidou

Editorial Secretary

South-Eastern Europe Journal of Economics

ASECU, University of Macedonia, 156, Egnatia Str., 546 36 Thessaloniki, Greece

The *Journal's* phone number is (+30) 2310891793, fax: (+30) 2310891748

e-mail: asecu@uom.edu.gr

Submission of a paper will be held to imply that it contains original unpublished work and is not being submitted for publication elsewhere. The Editor does not accept responsibility for damage or loss of papers submitted. Upon acceptance of an article, author(s) will be asked to transfer copyright of the article to the publisher. This transfer will ensure the widest possible dissemination of information.

(3) Papers will be considered in any form, but authors of papers accepted for publication will be expected to provide a final copy conforming to the general style of the Journal as outlined in notes 4 through 13 below.

(4) Manuscripts should be 1,5 spaced, with wide margins, and printed on one side of the paper only. All pages should be numbered in sequence. Titles and subtitles should be short. References, tables, and captions for the figures should be printed on separate pages.

(5) The first page of the manuscript should contain the following information: (i) the title; (ii) the name(s) and institutional affiliation(s) of the author(s); (iii) an abstract of not more than 100 words. A footnote on the same sheet should give the name, address, and telephone and fax numbers of the corresponding author [as well as an e-mail address].

(6) The first page of the manuscript should also contain at least one classification code according to the Classification System for Journal Articles as used by the Journal of Economic Literature; in addition, up to five key words should be supplied.

The classification system used in JEL can be found at:

http://www.aeaweb.org/journals/jel_class_system.html.

(7) Acknowledgements and information on grants received can be given in a first footnote, which should not be included in the consecutive numbering of footnotes.

(8) Footnotes should be kept to a minimum and numbered consecutively throughout the text with superscript Arabic numerals.

(9) Displayed formulae should be numbered consecutively throughout the manuscript as (1), (2), etc. against the right-hand margin of the page. In cases where the derivation of formulae has been abbreviated, it is of great help to the referees if the full derivation can be presented on a separate sheet (not to be published).

(10) References to publications should be as follows: ‘Smith (1992) reported that...’ or ‘This problem has been studied previously (e.g., Smith et al., 1969)’. The author should make sure that there is a strict one-to-one correspondence between the names and years in the text and those on the list. The list of references should appear at the end of the main text (after any appendices, but before tables and captions for figures). It should be double spaced and listed in alphabetical order by author’s name. References should appear as follows:

For monographs

Sen, A., 1970, *Collective Choice and Social Welfare*, San Francisco: Holden Day.

For contributions to collective works

Kornai, J., 1991, Stabilization and Economic Transition in Hungary: The Next Two Years, in J. de Melo and A. Sapir (eds.), *Trade Theory and Economic Reform: North, South and East*, Oxford: Basil Blackwell, 307-326.

For periodicals

Magdalinos, M., 1990, “The Classical Principles of Testing Using Instrumental Variables Estimates”, *Journal of Econometrics*, 44, 241-279.

Note that journal titles should not be abbreviated.

(11) Illustrations will be reproduced photographically from originals supplied by the author; they will not be redrawn by the publisher. Please provide all illustrations in quadruplicate (one high-contrast original and three photocopies). Care should be taken that lettering and symbols are of a comparable size. The illustrations should not be inserted in the text, and should be marked on the back with figure number, title of paper, and author’s name. All graphs and diagrams should be referred to as figures, and should be numbered consecutively in the text in Arabic numerals. Illustration for papers submitted as electronic manuscripts should be in traditional form.

(12) Tables should be numbered consecutively in the text in Arabic numerals and printed on separate sheets.

(13) Accepted papers should be submitted in electronic form in a storage media (i.e. CD, DVD, USB, etc.) with accompanying manuscript. Electronic manuscripts have the advantage that there is no need for re-setting of text, thereby avoiding the possibility of introducing errors and resulting in reliable and fast delivery of proofs. The preferred format is either .doc or .docx. Make absolutely sure that the file on the disk and the printout are identical.

(14) Page proofs will be sent to the corresponding author. Proofs should be corrected carefully; the responsibility for detecting errors lies with the author. Corrections should be restricted to instances in which the proof is at variance with the manuscript. There are neither submission fees nor page charges.