

T.C.
MARMARA ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İKTİSAT ANA BİLİM DALI
İKTİSAT (İNG) BİLİM DALI

**GLOBALIZATION AND INCOME INEQUALITY:
EVIDENCE FROM BRICS COUNTRIES AND TURKEY**

MA Thesis

BÜŞRA BAHADİR

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TEZ ONAY BELGESİ

İKTİSAT Anabilim Dalı İKTİSAT(İNGİLİZCE) Bilim Dalı TEZLİ YÜKSEK LİSANS öğrencisi Büşra BAHADİR'nın GLOBALIZATION AND INCOME INEQUALITY: EVIDENCE FROM BRICS COUNTRIES AND TURKEY adlı tez çalışması, Enstitümüz Yönetim Kurulunun 19.07.2019 tarih ve 2019-22/7 sayılı kararıyla oluşturulan jüri tarafından oy birliği / ~~oy çokluğu~~ ile Yüksek Lisans Tezi olarak kabul edilmiştir.

Tez Savunma Tarihi 20/07/2019

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Degree Awarded and Date : MA- 06.2019

Keywords : Globalization; Income Inequality; Panel Data

ABSTRACT

GLOBALIZATION AND INCOME INEQUALITY: EVIDENCE FROM BRICS COUNTRIES AND TURKEY

Income inequality has increased dramatically in the most countries, especially in developing countries, over the past three decades and it has become a widespread concern. The widening income disparity within countries has coincided with the process which countries increasingly exposed to the globalization through increased flows of goods, services, capital and labour across international borders. This thesis examines the relationship between globalization (measured with both financial and trade variables) and income inequality using a panel of Turkey and the BRICS countries over the period 1990–2015. The econometric model is estimated by using convenient panel data techniques. The findings indicate that trade openness through import and export channel exhibits a disequalizing impact, while financial globalization with the channel of capital account openness and stock market turnover rate has been the driving force of income inequality in these countries since 1990. The absolute skill-bias impact of high technology export is evidenced by empirical results. Other findings exhibit that private credit, population growth and consumer price index allow the benefits of globalization to be shared unequally.

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Tez Türü ve Tarihi	: Yüksek Lisans – 06.2019
Anahtar Kelimeler	: Küreselleşme; Gelir Eşitsizliği; Panel Veri

ÖZET

GLOBALIZATION AND INCOME INEQUALITY: EVIDENCE FROM BRICS COUNTRIES AND TURKEY

Geçtiğimiz otuz yıl boyunca çoğu ülkede, özellikle gelişmekte olan ülkelerde, gelir eşitsizliği önemli ölçüde arttı ve bu durum yaygın bir endişe haline geldi. Ülkelerde artan gelir eşitsizliği malların, hizmetlerin, sermayenin ve emeğin uluslararası sınırlar arasında dolaşımının artması yolu ile ülkelerin küreselleşmeye maruz kaldıkları döneme denk gelmektedir. Bu tez, Türkiye ve BRICS ülkelerinden oluşan bir paneli kullanarak 1990-2015 yılları arasındaki küreselleşme (finansal ve ticaret değişkenleri ile ölçülen) ve gelir eşitsizliği arasındaki ilişkiyi incelemektedir. Ekonometrik model uygun panel veri teknikleri kullanılarak tahmin edilmiştir. Bulgulara göre, finansal küreselleşme sermaye hesabı açıklığı indeksi ve borsa cirosu oranı kanalıyla 1990'dan beri bu ülkelerde gelir eşitsizliğinin itici gücü olurken, ithalat ve ihracat kanalı ile dışa açıklık ise gelir eşitsizliğini artıran bir etki sergilemektedir. İleri teknoloji ihracatının mutlak beceri yanlılığı etkisi ampirik bulgularla kanıtlanmıştır. Diğer bulgular özel kredilerin, nüfus artışının ve tüketici fiyat endeksinin küreselleşmenin faydalarının eşit olmayan şekilde dağılmasına neden olduğunu göstermektedir.

To my little lovely daughters



ACKNOWLEDGEMENT

First and foremost, I would like to express my gratitude and sincere thanks to my thesis supervisor Asst. Prof. Bilge Eriř Dereli for her guidance, support, patience and encouragement throughout the preparation process of my thesis and prompt feedbacks whenever I needed. I also would specially thank to Prof. Dr. İ. Mahmut Tekçe for his guidance during my master education.

I would like to thank to my thesis committee members Prof. Dr. İ. Mahmut Tekçe and Dr. Suna Gönültaş for their valuable comments.

I am deeply grateful to my parents and my sisters for their endless support and belief in me during my entire life. I would specially thank to my sisters Fatmanur Ülker and Ebru Ülker for all things which they did to make my life easier. I owe special thanks to my beloved husband Kenan for his love, patience, encouragement and support during this process. Finally, I also would like to present special thanks to my lovely cute daughters Vera and Ada for giving life energy to me and for smiling to me everytime.

Thank you all.

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LIST OF ABBREVIATIONS

WWI	World War I
WWII	World War II
EMDCS	Emerging and Developing Countries
PRC	Pew Research Center
HO	Heckscher-Ohlin
SS	Stolper-Samuelson
HOSS	Heckscher-Ohlin Stolper-Samuelson
SBTC	Skill Biased Technological Change
FDI	Foreign Direct Investment
DCs	Developing Countries
GATT	General Agreement on Trade and Tariffs
WTO	World Trade Organization
NTB	Non-tariff Barriers
FDI	Foreign Direct Investment
MICs	Middle-Income Countries
OECD	Organization for Economic Co-operation and development
SWIID	Standardized World Income Inequality Database
TFP	Total Factor productivity
DCs	Developing Countries
SET	Skill Enhancing Trade
ICTs	Information and Communication Technologies
GDP	Gross Domestic Product
WDI	World Development Indicators
UNCTAD	United Nations Conference on Trade and Development
PWT	Penn World Table
IMF	International Monetary Fund

WEO	World Economic Outlook
UTIP- UNIDO	University of Texas Inequality Project- the United Nations Industrial Development Organization
MENA	Middle East and North Africa
EU	European Union
OLS	Ordinary Least Squares
DOLS	Dynamic OLS
GMM	Generalized Method of Moments
U.S.	United States
WIID	World Income Inequality Database
NSSO	National Sample Survey Organization
UNU-WIDER	United Nations University World Institute for Development Economics Research
ICTs	Information and Communication Technologies
IT	Information Technology
KAOPEN	Capital Account Openness
CPS	Current Population Survey
ADF	Augmented Dickey Fuller
LLC	Levin, Lin and Chu
FE	Fixed Effect
RE	Random Effect
BLUE	Best Linear Unbiased Estimate
LM	Lagrange Multiplier
PCSE	Panel-Corrected Standard Errors

1. INTRODUCTION

The world history have experienced three waves of globalization since the mid-19th century. The first episode began in the second part of the 19th century and lasted with the onset of World War I (WWI). The second wave started after World War II (WWII) and ended with the late 1970s. Since 1980s economic integration has reached to an unprecedented levels in the world economy. Globalization has happened before, but not like this. The process of intensive globalisation with the participation of lots of world countries repeated in the late 1980s after occurrence of some technological, geopolitical and institutional changes. In the 1980s, the third wave of globalization has began and it has been different from other two waves in terms of some features. Firstly, more and more developing countries have entered into the global markets. Secondly, other developing countries has marginalized progressively in the world economy and their incomes has declined and poverty level has increased. Third feature is the importance of international migration and capital movements, which were not taken into account during second (Collier and Dollar, 2002).

Increase in income inequality has became a widespread concern. Within country income inequality in the most advanced countries, in emerging markets and in developing countries (EMDCs) has increased and this fact has took a considerable attention in recent years. President Obama described this income inequality rises as the “defining challenge of our time.” According the recent Pew Research Center (PRC 2014) survey, more than 60 percent of respondents in the worldwide has regarded the the gap between the rich and the poor as a major challenge. Not surprisingly, policymakers and researchers has accepted the issue of income inequality and its determinants as some of the hot debated issues.

Within-country income inequality in many developed and developing countries have increased since the 1980s. The increases in the flows of capital, goods, services and labor across international borders has coincided with the period of the expanding income gap of the countries. The academic and policy circles have debated the issue that whether globalization is responsible for this rising income inequality within countries. This study also examines contribution of globalization to within-

country income inequality by taking into account the two sides of globalization, financial globalization and trade globalization.

The rise in the income inequality across most countries over the past three decades is seen as one of the greatest problems in both developed and developing countries. The integration of the former Soviet bloc countries to the world economy, liberalization of markets and technological improvements have integrated the the world economy in an unprecendent level but all segments of the population have not benefited equally from rising incomes and aggregate GDP growth related with globalization. Indeed, income inequality has increased in most countries and regions over the past three decades, in particular in developing countries. Since trade and financial integration have reached to unprecendent levels in this period, the debates on rising income inequality has mostly focused on the role that globalization.

Non-tariff barriers (NTBs) consists a major part of protection of trade and the measurement of them are difficult. The using of them prevented the measurement of rising trade openness in developed countries in the last decades. This measurement problem is solved traditionally by using imports, exports, or the sum of the two as proxies of a country's openness, and the increase of trade volume over time is interpreted as the consequence of the decline of trade or transportation barriers. As opposed to developed countries, many developing countries had advantageous position in the late 1980s and early 1990s in terms of a measurement of trade liberalization. Because a major part of these developing countries did not participated in the General Agreement on Tariffs and Trade (GATT) and they did not have membership in the World Trade Organization (WTO), (e.g., Brazil, Colombia).

World trade, measured as the share of imports and exports to GDP, has increased in real terms since 1990, and its share in world GDP has risen from 38.7 percent in 1990 to 57.8 percent in 2015. The share of total trade in GDP for developing countries increased from 49 percentage in 1990 to 69 percentage in 2013. After participation of former Eastern bloc countries into the international trading system and removing of trade barriers in most trade closed areas such as developing Asia in 1980, integration in terms of trade has increased in 1990s. An important point is that all

groups of emerging market and developing countries which are classified with their income levels have been catching up with high-income countries by taking into account their trade openness which expresses the integration of low- and middle-income countries' trade regimes toward the more open trading systems of advanced economies. Figure A1 in Appendix A demonstrates the increase in trade openness of BRICS countries along with Turkey in the period 1990 and 2015. Detailed figures which demonstrates the time series graphs of imports and exports of these countries and are also presented in Appendix A. As it can be seen in this figure, all of these countries exhibit continuous increase in their total trade levels. Only the Russian Federation has a big jump and later a big fall in the early 1990s due to the political reasons. The import and export figures follow the same path as total trade.

Financial globalization has also progressed rapidly over the past three decades. Aggregate amount of assets have increased its share in global GDP from 58 percent in 1990 to 131 percent in 2004. World FDI inward stock has increased from 9 percent in 1990 to 34 percent in 2015. In addition to the financial integration of advanced economies to the world economy fastly, cross-border assets and liabilities in other parts of world has also increased. Figure A5 in Appendix A demonstrates the increasing trend in total assets and liabilities as financial openness measure for these countries after 1990 in particular in South Africa. Developing countries FDI share in GDP has increased to 29 percentage as it was 13 percentage in 1990. Finally, BRICS countries FDI inward stock has increased from 5.54 percent in 1990 to 14.64 percent in 2015. Figure A4 in Appendix A presents FDI of these countries as the financial openness measure between 1990 and 2015. It can be obviously seen the fluctuations but generally rise in FDI stocks in this period. As same in total assets and liabilities, South Africa exhibits substantial increases in FDI inward stock.

It is generally accepted view that more advanced and developing economies, typically BRIC countries, has been affected from this globalisation wave. The intensification of this globalization process is naturally impossible to deny. Gini coefficients after transfers and taxes of this country group are presented in Figure 1. Four of the BRICS countries showed increases in income inequality between 1990 and

2015. Brazil was an exception and it exhibited decreasing income inequality in the same period. Brazil's net Gini coefficient was 53 percent in 1990 and has decreased to 45 percent in 2015. Turkey had also same situation like Brazil. The Gini levels of India and China has increasing trends. India's Gini index is above the mean value of these countries (46 percent). Russia exhibited a fluctuation over this period and it dropped back to the 39 percent in 2015 after its peak value in 2004. Finally, South Africa is an important country in terms of its inequality level. Because, its Gini has increased continuously since 1990 and it is 59 percent in 2015. This value is well above the average of these countries.

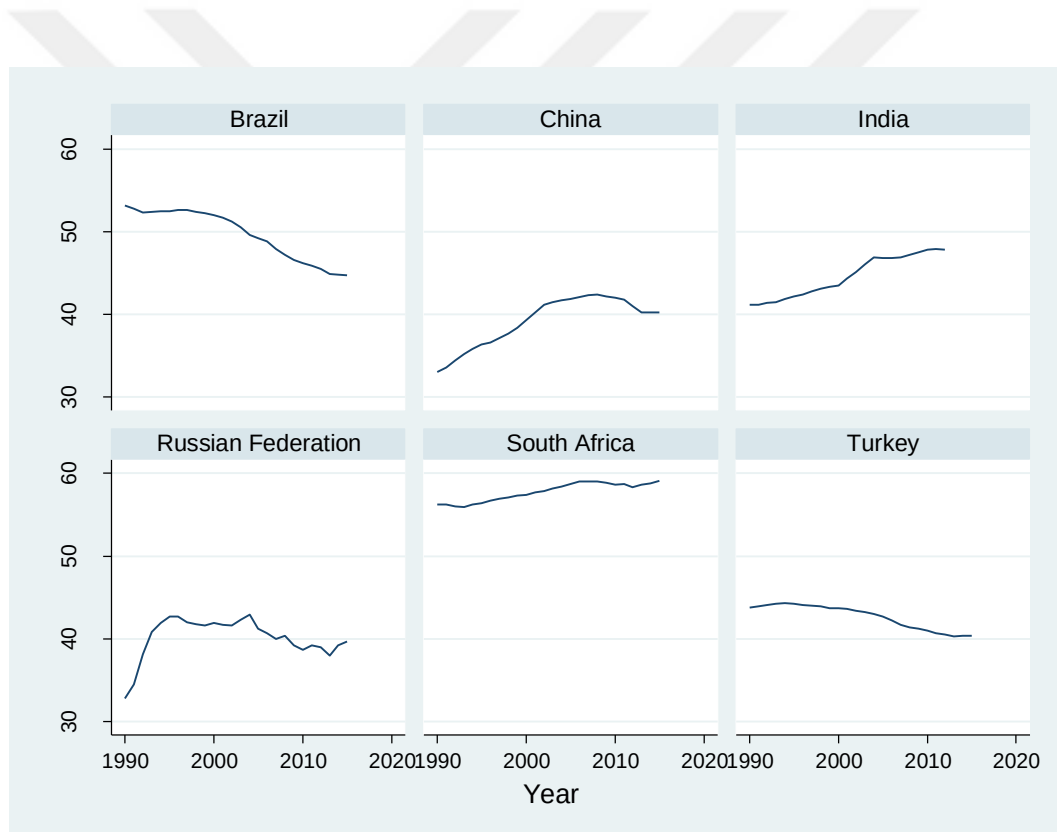


Figure 1: Income Inequality in Selected Countries

Source: Standardized World Income Inequality Database (SWIID)

The impact of globalization on employment and the distribution of incomes has been debated over the recent three decades in particular in the developing countries. The liberalization of trade and finance contributed the increase in the integration of product, labor, and capital markets internationally. In addition to these improvements, rapid

technological change has contributed to decrease in the costs of trade in goods and services by accelerating the international integration process.

This thesis investigates the link between the trade and financial globalization and the income inequality that a major part of countries especially developing countries have experienced in the last decades. The important question of this study is that how globalization affects the within country income distribution. There are two purposes; analyzing the changing structure of globalization and income inequality over the past three decades and determining the basic channels through which globalization affect the within a country income distribution.

In the 1980s and early 1990s, the relative return to unskilled labor deteriorated for most developed and developing countries coincident with the increase in globalization components. There has been several theoretical and empirical studies to define the relation between globalization and changes in employment structure since the late 1980s. There are lots of econometric studies which have handled that whether globalization has significant impact on inequality problems of developed and developing countries. Moreover, the available studies focus on different perspectives of globalization such as trade flows, foreign direct investment and the capital account openness.

In addition to previous studies, this study focuses largely on trade globalization and different channels of financial globalization to propose a more detailed view to measure the aggregate effect of globalization. Additionally, this study aims to analyze empirically the association between globalization and income inequality in BRICS countries and Turkey. Contribution of this paper to the existing literature is that it concentrates on the effects of trade and financial globalization on inequality together and presents new empirical results based on a unique panel dataset covering the BRICS countries and Turkey over the period 1990-2015.

The panel is constructed for BRICS countries and Turkey from 1990 to 2015 to analyze the within-country income inequality by using net Gini coefficients from Solt's (2008) developed Standardized World Income Inequality Database (SWIID) as our

inequality measure. By estimating a fixed-effect model of income inequality, this analysis concludes that increasing trade and financial liberalization has opposite effects on income inequality. Trade openness is related with higher income inequality, whereas increased financial liberalization, total assets and liabilities and capital account openness, is found to be related with lower inequality. The technological change is mostly associated with increased globalization and and it is found to have increasing impact on income inequality by consistent with the literature.

In this context, the next section consists of the theoretical background and empirical background which are included the literature review part. The third section explains the data in details and also covers the model and the empirical methodology. Section 4 presents the empirical results. The final section concludes.

2. LITERATURE REVIEW

This section aims to show the considerable literature on globalization and income inequality with different perspectives.

2.1. Theoretical Background

Although there is no commonly used definition of globalization, Bhagwati (2004) defines globalization as “integration of national economies into international economy through trade, foreign direct investment, short-term capital flows, international flows of workers and flows of technology”. Houck (2005) describes globalization as “integration, in terms of people, capital, ideas, technology, and services”. Goldberg and Pavcnik (2014) describes globalization as “a catch-all term that is used to describe phenomena as diverse as trade liberalization, outsourcing, increased immigration flows, removal of capital controls, cultural globalization and generally faster transmission of international shocks and trends”.

Income inequality may occur as a result of an increase in incomes of more skilled workers relative to the incomes of less-skilled workers. This situation results from a rise in the demand for skilled labor relatively compared to the unskilled labor. In this paper, Gini coefficient is used as the income inequality measure which is used as common measure in the literature. “The Gini coefficient is an area measure of the extent to which a Lorenz curve departs from the 45 degree line. The Lorenz curve captures all of the quintile share information for a given income distribution. The Lorenz curve lies below the 45 degree line” (Lambert, 2001). The Gini coefficient takes the value between 0 and 1. A higher Gini coefficient refers to higher inequality.

Globalisation affects income inequality and structure of employment in the country. In the world, countries traded more, direct investments of countries in other countries increased more and more, and rise in volume of import from developing world economies. These movements are major determinants of income inequality in BRICS countries and Turkey. In addition to this, technological improvement brought the high skilled labors to an advantageous position. To deal with the new information and communication technologies, more skilled people are necessary and so more demanded

or skills which are associated with the financial sector have gained significant incomes . But, low skilled or no skilled workers have remained behind of high skilled counterparts. Thus, the income disparity between high and low skilled workers has expanded (OECD, 2011).

Economic theory which explains the basic analytical relation between trade liberalization and income inequality is put forward from the Stolper Samuelson theorem. This theory explains this relationship in a structure which includes two countries and two factors. While developing countries increase trade openness through tariff reduction, this situation would increase the earnings of low skilled workers and decrease the earning of high skilled worker. As a result, income inequality decreases. For a developed country which has relatively abundant high skill factors, the inverse is valid which means higher income inequality as a result of an increase in trade openness (Stolper and Samuelson, 1941).

According to generally accepted trade theory called as Heckscher-Ohlin Stolper-Samuelson (HOSS), openness contributes to the relatively abundant factor of country because of the specialization of trade on the sectors using the abundant factor intensively. Compared to the world economies, most of developing countries are relatively unskilled abundant while developed countries are relatively skilled abundant. So, developing countries have a comparative advantage in the usage of unskilled labor. According to this theorem, developed countries focus on the production of skilled labor intensive goods like machinery while developing countries focus on the production of unskilled labor intensive goods like textiles. This model implies simply that developing countries import skilled labor intensive goods and they uses trade barriers on the import of skilled labor intensive products. Trade reforms which lead to the decline in protection decrease the price of the imported products which uses skilled labor intensively. Earnings of skilled workers which are used in the import sector decreased and unskilled labor using intensively in the export sector gained benefit in this framework. As a result of this process, trade liberalization increases the demand for the unskilled labor and incomes of them so resulting with an entire decline in income distribution and within-country income inequality (Stolper and Samuelson, 1941).

One of the most important qualification of the Stolper Samuelson theorem is the international immobility of capital and labor. If the movement of capital is permitted across borders freely, basic assumption is violated. Foreign direct investment which is often directed at high skill sectors in the host country is a significant evidence for this situation. In addition to this, skill structure of FDI may be accepted differently from the perspective of the less-developed country and the advanced country. Thus, FDI flow from advanced countries to developing economies may increase the income inequality in these countries by rising the demand for skilled labor relatively. If these aspects are considered, the empirical literature has mixed results for this view. Not only foreign direct investment but also portfolio debt, equity flows, and bank lending across borders are another way of capital to flow.

According to Krugman and Venables (1995) , there are two regions in the world. North and South can produce two types of goods. Manufactured goods are subject to increasing returns to scale versus constant returns to scale in the production of agricultural goods. The manufacturing sector produces both intermediate goods used as inputs in the production of other goods and final goods which are sold to consumers. Moreover, there is no comparative advantage in manufacturing between regions. In the case of high transportation costs, there will no trade between countries and each country will try to produce these two goods products. If transportation costs decline gradually, the trade between the regions will occur. This story explains that transportation costs decreases continuously, this leads to the more integrated world economies. After division of the world into rich and poor parts, incomes converges to each other between these two regions.

The HOSS theory builds on the David Ricardo's comparative advantage theory by considering production and trade together considering the factor endowments of the countries trading each other. Wood (1994) extended the basic framework of this theory by considering multiple skill structures of workers. His model includes two production factors which are skilled and unskilled labor, two type of countries, the North representing developed countries and the South standing for developing countries, both produces two type of goods which are skilled intensive and unskilled labor intensive.

When this theory is applied on developing countries, liberalization policies on trade should increase relatively the demand and the prices for unskilled labor and reduce the wage gap between skilled and unskilled labor in developing countries which are low skilled labor abundant countries and as a consequence causing a decrease in income inequality. For developed countries which high skilled labors are abundant, the reverse situation would be valid.

Skill biased technological change may occur over the world independent of trade openness and thus, income inequality may increase in the absence of trade reforms. If technological improvement was accepted as a result of trade liberalization, increase in skill premium could be an indirect response to trade reforms. Many papers have theoretically explained that trade liberalization have led or contributed to skill biased technological change. Wood (1995) which is one of the oldest papers brought a new notion “defensive innovation” to explain the reaction of countries to trade liberalization. His approach points out that competition with foreign firms may lead domestic firms to tend to research and development or benefit from available new technologies. Mathias Thoenig and Thierry Verdier (2003) developed this theory. The theory may be more suitable developed countries but it may be appropriate for developing countries such as Brazil which made substantial trade reforms. In the 1980s and 1990s, low income developing countries took part in the world markets and middle income developing countries that implements import substitution accelerated the technological changes after the entry of new competitors in their low skill intensive sectors.

There have been some important critiques about the theoretical framework of Heckscher- Ohlin Stolper Samuelson (HOSS, hereafter) theorem. The main assumptions of this model are so restrictive to define the real world. Under the main assumptions of this theory, given country’s position among the other countries within its “cone of diversification” is important in terms of evaluating the effect of trade openness. The Standard Lerner-Pearce diagram puts the rich and the poor country in different “cones of diversification”, thus factor prices does not become equal (Davis, 1996).

Relative position of developing country may be accepted as unskilled abundant globally, but this may not be correct compared to other developing countries. This may

be explained by one example in details. Suppose there are three countries, three goods and as two production factors which are skilled and unskilled labor. United States as a rich region is in one cone which is relatively skilled labor abundant and so focusing on the production of most skill-intensive good. Other two countries which are poor are in the other cone. One of them is less skill-poor than the other country. The explanation of this is that one of this poor countries could be unskilled labor abundant as compared to US, but it may be skilled labor abundant compared to other poor one. Therefore, the consequences of trade between these poor countries can be the opposite of the traditional HOSS framework (Bardhan, 2005).

This debate gains importance when the position of middle income countries is taken into account. Because middle-income countries (MICs) are relatively unskilled labor abundant compared to the high income countries and relatively skilled labor abundant compared to low income partners. If MICs liberalize their trade, they compete with the labor abundant low income countries on the labor intensive goods with low wage. Their comparative advantage in labor intensive exports may change and this probably results with a wider wage gap by decreasing demand and wages for unskilled workers (Meschi and Vivarelli, 2007).

Feenstra and Hanson (1996) extended this theoretical framework. His model includes a simple final good and the production process of this good requires the intermediary goods with different shares of skilled and unskilled labor. According to their assumption, developing country has a comparative advantage in the production stages which uses unskilled labor intensively while the developed country has efficiency in the production of unskilled labor intensive parts. Production of intermediate goods would shift from developed countries to developing countries thanks to the trade and foreign direct investment after trade openness. Developed country may seem these intermediate goods as unskilled labor intensive but these would be characterized by developing country's perspective as skilled labor intensive. Thus, skill premium rises in both regions due to the increase in the demand for skilled labor in the North and the South.

Feenstra and Hanson (1997) asserted a basic argument which depends on the assumption that intermediate inputs which has different skill intensities are necessary to produce final goods. The production of some of these intermediate goods shift from developed countries to developing countries by the help of removal of capital controls. These goods would be accepted as unskilled-intensive in terms of a developed country but they may be skilled-intensive in terms of recipient developing country. In case of FDI inflow from developed country to developing country may cause the increase in income inequality in both countries.

Zhu and Trefler (2005) have expanded the model of Feenstra and Hanson by excluding foreign direct investment but with the comparative advantage theory which based on factor endowments. In their model, developing country improves its technology and thus, production of least skill intensive goods in the North shift to countries in the South where they are produced as the more skill intensive. As presented in the Feenstra and Hanson, this process also leads to increase in the skilled labor demand in both developed and developing countries.

If firms break into the foreign markets, they can acquire international knowledge easily. Importing companies provides product design and technical support to their suppliers to increase the quality of goods. In addition, they may transfer the tacit knowledge obtained from other suppliers which operates in advanced countries to the suppliers which locate in developing countries. Yeaple (2005) states that increases in export opportunities make advantageous the acceptance of new technologies for more firms and this increases demand for skilled labor and finally increases the skill premium. Bustos (2005) extended the analysis of Yeaple (2005) and his model discusses that liberalization of trade increases export revenues by decreasing several export costs and by this way leads more firms to break into the export market thanks to the more profitable new technologies.

Verhoogen (2007) discussed that product quality of exporting firms as average is increased by openness and this generates the requirement for the high skilled workforce. He proposed a hypothesis which is called 'quality-upgrading hypothesis' and this hypothesis is more suitable than the 'outsourcing hypothesis' to explain the

increased income inequality in Mexico. Maurin, Thesmar, and Thoenig (2002) investigated the impact of exports on employment composition and they showed that export activity requires more skilled labor in specialized service activities, such as sales persons, lawyers, marketing personnel, etc.

Xu (2000) has developed a model which generates a U-shaped association between trade openness and income inequality in developing countries. According to this model, if trade barriers or protection are relatively high, liberalization of trade results with decrease in income inequality or vice versa. The important point is that trade liberalization reduces the demand for nontraded goods while increasing the demand for traded goods and net effect between them describes relative wages.

Acemoglu (2003) developed a different model that is endogenous technological change. According to this model, this technological change may take the shape of the increase in the imports of machines, office equipment and other capital goods which complements the skilled labor in developing countries. Trade liberalization contributes the technological improvement by increasing international flows of capital goods and affects demand for skilled labors by decreasing the prices of these capital goods and increasing their imports. As long as new technologies are included in these capital goods, increase of these goods' imports should support the spread of technology among developing countries and increases demand for skilled labor. The literature about the contribution of imports on international technology transfer explores that these import flows provides developing countries' domestic firms to attain new technologies embodied and creates chances for reverse engineering.

Easterly et al. (2004) defines the globalization as "the free movement of goods and factors of production (capital, labor) across international borders". Conventional analysis focuses on the impact of trade and financial flows on returns to factors, on factor accumulation, and on national income by describing the effect of globalization on income inequality. He defines two types of world. If income differences stem from productivity differences, it is called "Productivity World". If income differences arise from different factor ratios, it becomes "Factor World". Factor World is accepted nations to have equal productivity levels whereas countries has different productivity

levels in Productivity World. Trade flows decrease income inequality in Factor World, but its impact is uncertain in Productivity World.

HOSS theory assumes that all countries have identical technology. If this assumption is removed and one assumes that developing countries and developed countries have different technological structure, trade openness makes easy to transfer of technology from North to South. At this point, the ultimate effect of trade openness on demand of labor is attached to the skill density of the transferred technology relative to the currently used technology. Technologies which are transferred is expected relatively more skill intensive than those in use in the domestic country before trade liberalization. As long as technological improvement is connected to international liberalization process, trade openness may lead to the rise in the demand of skilled labor in developing countries opposite to the theorem of Stolper Samuelson.

The other aspect of the globalization is financial liberalization such as Foreign Direct Investment. FDI is accepted as an important driver of economic growth but it may increase the wage inequality between skilled and unskilled labor and increase the regional inequality. Income inequality is a good concept which includes all dimensions of inequality (Bhandari, 2007).

Theoretical literature generally use the standard trade theory to explain the connection between FDI and income inequality. According to general view of literature, FDI affects a developing recipient country similarly the HOSS theory. Both foreign direct investment and trade use the low-skilled labor abundantly in developing countries. As a result of this, increase in demand of low skilled labor increases the wages of low skilled workers in developing countries and this leads to decline in wage disparity and income disparity in therecipient developing country. Since developed country is source of FDI, income inequality increases reversely. However, there are important theoretical argument against these assumptions.

Berman and Machin (2000) points out the impact of FDI on the increase in labour productivity in the foreign firms which are transferring technology and local firms which are affected from spill-over effects. If this impact on productivity is skill-

biased like in information technology, it can be said that FDI leads to increase in skill-biased technological change. Lee and Vivarelli (2006) claimed that if the transferred technologies through FDI are relatively more skill intensive than those in use in the recipient country before financial globalization, FDI inflows may give rise to reverse consequences compared to Stolper –Samuelson theorem.

The link between income inequality and financial globalization is explained through the FDI. A major part of the related literature shows that financial development affects the income distribution by increasing the demand for skilled labor, it does not mean that it leads to distribute the income more unequally. Greater account liberalization may allow the poor to reach the financial resources easily. Thus, the incomes of the poor may increase more than the average and it induces a reduction in income inequality (Back et al., 2007). Mundell (1957) points out that capital flows may raise the marginal productivity of workers in the recipient country. This leads to the rise in the income level of the poor workers and narrows income gap. Figini and Gorg (1999) asserts that FDI penetration may increase demand for high-skilled labor at the first stage in developing countries but after less skilled workers capture the technological improvements, their incomes starts to increase in the long run by leading to decrease in income inequality.

2.2 Empirical Background

The empirical studies which investigate the impacts of globalization on the income distribution use trade related variables, financial globalization variables which explain the liberalization of financial accounts, and also the variables which represents technological changes. Economic theory does not give certain and clear results on whether globalization affects income inequality in advanced and in developing countries.

Goldberg and Pavcnik (2004) explained the reasons behind the rise in demand for skilled labor in developing countries by connecting them with trade liberalization. The reasons behind the rise in skilled labor demand are increase in skill intensive jobs, Stolper Samuelson effects, skill biased technological change, transfer of production of

intermediate goods from developed to developing countries which also includes the increase in FDI flows to developing countries, skill-biased technological change and changes in the composition of goods produced in developing countries.

Coe and Helpman (1995) studied on a panel of OECD countries and found that trade liberalization increases the international flows of capital goods that allow the domestic firms to reach the new technologies and constitutes chances for reverse engineering. The empirical results shows that the foreign knowledge which embodied in traded goods¹ affects significantly and positively the total factor productivity (TFP) of importing countries. This analysis has been extended on developing countries by Coe et al. (1997) and they found that TFP increases with the imports of intermediate goods in DCs.

Hanson and Harrison (1999) investigated the changes in wages and employment of skilled and unskilled workers in Mexico after the trade reform of 1985. They found that the price of the goods from manufacturing sector fell because of the increased competition with the countries which have more reserves of cheap unskilled labor than Mexico. Moreover, the low skilled industries are affected from the reduction in tariff protection in 1985. Thus, after the implementation of trade reform, the wage gap between skilled and unskilled worker widened in Mexico.

Pavcnik et al. (2004) and Goldberg and Pavcnik (2005) states that different industries employ different share of skilled workers and relative income of skilled and unskilled workers change as a result of change in wage premiums. Taking into account this proposal, since larger tariff reductions are made in sectors that employ a larger share of unskilled workers, income of unskilled workers increases relatively as a result of increased wage premium in these sectors. As a result, they found that trade liberalization contributed to the decrease in wage inequality between skilled and unskilled workers in India.

Topalova (2004) examined the impact of India's trade liberalization, specifically tariff reductions, in the beginning of 1990s on productivity of the

¹ He defines foreign knowledge as "the sum of trading partners' R&D stocks (as a measure of knowledge quality) weighted by bilateral trade shares (as a measure of knowledge quantity)".

manufacturing sector firms using a firm level panel data and detailed data between 1989 and 2001. According to this paper, decline in trade protectionism by decreasing tariffs give rises to higher level of increases in firm productivity which the impact of it is robust and highly significant for private companies but there is no evidence that trade liberalization contributes to improvements in productivity level of government-owned or foreign companies.

Pavcnik et al. (2004) examined the impact of trade liberalization in Brazil between 1988 and 1994 on changes in wages of skilled and unskilled workers. According to this study, there is no statistically significant relation between changes in trade reform and industry wage premium or likewise between trade policy and skill premiums of university graduates in industry. They resulted that trade liberalization in Brazil had no significant contribution in increase in wage disparity between skilled and unskilled workers through changes in industry wage premiums.

Feenstra and Hanson (1996) points out the importance of trade in intermediate goods and discuss that the rise in the “global production sharing” or outsourcing may cause the increase in the demand for skilled labor in both developed and developing countries. Goldberg and Pavcnik (2004) proved this hypothesis empirically on maquiladora region in Mexico. Intermediate goods are exported to this region by US firms and production activities and the assembly of intermediate goods occur. This study has an importance because it examines the link between outsourcing and income disparity.

Goldberg and Pavcnik (2004) investigated the severe Colombian trade liberalizations in the 1980s and 1990s to examine the association between protection and industry wage premiums. Colombia liberalized its trading regime gradually by reducing the tariff levels and removing the nontariff barriers to trade from 1984 to 1995. Tariffs decreased along the period, but the most prominent reforms appeared in 1985 and 1990–1991. They found the significant impact of trade liberalization on relative wages.

Kumar and Mishra (2005) evaluated the changes in manufacturing industry wage structure after the trade liberalization of India in 1991 by using a micro-level data and international trade protection over the period 1980–2000. Industry wage premiums are described as the share of individual wages which are determined according to the dependency of workers in their industry after controlling for the characteristics of worker. The result is that reductions in tariffs are related with the increase in wages within an industry consistent with the productivity increases.

Wei and Wu (2007) examined the impact of trade openness on the income inequality of China by using a unique data sets on 39 urban and 40 rural regions over the period 1988 and 1995. The analysis of authors reveals that urban-rural income inequality decreases with the trade liberalization by leading to a small increase in intra-urban income inequality and a decline in intra-rural income inequality. Eventually, they reached that more openness means less income inequality. This finding is opposite of the most common view that trade openness increases in income inequality.

Meschi and Vivarelli (2007) discussed the impacts of trade flows on income distribution of developing countries. Using a panel of 70 DCs in the period 1980-1999 and dynamic specification method, they estimated the consequences of trade on within-country income inequality. They found the weak relationship between total trade flows and income inequality. They also separated the aggregate trade flows according to their origin and destination areas. They concluded that income distribution deteriorates in DCs after trading with high income countries both through import and export flows. This result is consistent with the hypothesis that the income distribution effects of trade openness are shaped by the technological differentials across trading countries. In addition, the impact of trade between the middle income DCs and low income ones on income distribution is tested, they concluded that the previous result is valid only for MICs.

Jaumotte, Lall and Papageorgiou (2008) examined the relationship between trade and financial globalization and the increase in income inequality in several developed and developing countries in past decades. They found that the observed increase in income inequality in both developed and developing countries over the past

three decades stems from the technological changes. Moreover, the effect of globalization has limited contribution to income inequality and offsetting impact on income inequality. Increase in trade volume tends to decrease income inequality while financial globalization, especially foreign direct investment tends to make worse it. In addition to these, globalization and technological changes increase the gains of human capital by increasing the demand for skilled labor and also by emphasizing the importance of education in the explanation of the increase in income inequality. While income level of all segments of population in the sample countries increased, incomes of high educated and high skilled increased disproportionately more.

Dreher and Gaston (2008) examined the the overall effect of globalization on both income and earnings inequality for a panel of 123 countries over the year 1970-2010. They used the University of Texas Inequality Project (UTIP)- the United Nations Industrial Development Organization (UNIDO) measures of industrial wage and household income inequality as the measures of income inequality. The economic globalization variables which is used in this study is trade, FDI, and portfolio investment. They results demonstrate that industrial wage and household income inequality increase with globalization.

Meschi and Vivarelli (2009) discussed the impacts of trade flows on income distribution within-countries by using a panel of 65 DCs in the period 1980–99 and a dynamic specification for the estimation. They also pointed out that the relationship between trade and technology adoption may differentiate the incomes in the DCs in the liberalization process through skill enhancing trade. After separating the aggregate trade flows according to their origin and destination region, they suggested that trade with high income countries through import and export flows makes worse the distribution of income in developing countries. These results support the hypothesis that technological changes and the skill biased nature of new technologies are substantial factors in determining the distributive effects of trade. According to this paper, these results are valid for the middle income countries since they are potential countries for technological improvements.

Dogruel and Acar (2012) aimed at explaining the manufacturing pay inequality and its determinants in selected Middle East and North Africa (MENA) countries for the 1980-1997 period by focusing on the dynamics of domestic wage differentials. Manufacturing pay inequalities are investigated by using panel data analysis and the UTIP-UNIDO Wage Inequality Theil Index is used as a measure of manufacturing pay inequality in the analysis. It is concluded that GDP per capita and female labor force participation rate has positive effects on pay inequality and openness as an indicator of trade liberalization, manufacturing value added has inequality-decreasing effect. Urbanization and education are not statistically significant effect on pay inequality in the analysis.

Mah (2013) examined the effect of globalization and decentralization on the income inequality of China for the period from 1985 to 2007. Trade liberalization and increase in FDI inflows are used as the indicators of globalization. As the measure of trade openness, the ratio of total imports and exports to GDP is used and Stock and Watson dynamic OLS (DOLS) estimation method is applied.

Asteriou, Dimelis and Moudatsou (2013) investigated the relationship between income inequality and globalization which is measured with trade and financial variables by using a panel of the 27 European Union countries between the years 1995 and 2009. They performed the same analysis by dividing these 27 EU countries into four subgroups according to their development levels. Their results demonstrated that trade openness performs an equalizing impact but financial globalization through FDI, capital account openness and stock market capitalization are the significant determinants of income inequality for these countries since 1995. FDI has the biggest share in the increase in income inequality. Although the impact of trade remained significant, the financial globalization has disparities within a certain group or among country groups.

Dabla-Norris et al. (2015) used a sample of almost 100 countries which composed of advanced, emerging and developing economies over the period 1980–2012 to determine the determinants of changes in income inequality within countries. This work is important compared to previous works in terms of country content of it. It

covers lots of countries to see the drivers of income inequality on different types of countries. The results revealed that trade openness has decreasing but not statistically impact on income inequality. However, financial globalization and technology have disequalizing impact. In particular, the results show that private credit as an indicator of country's financial structure increases income inequality in EMDCs. Cevik and Correa-Caro (2015) found the statistically insignificant effect of trade openness on income distribution for China and BRICS+ countries over the period 1980-2013.

Tridico (2017) examined the drivers of rise in income inequality in OECD countries over the past two decades. They hypothesized that intensification of labor market flexibility, weakening of labour market institutions and decrease in public spending with the financialization of economies since 1990 have caused to increase in inequality. He used a panel of 25 high-income OECD countries between the years 1990 and 2013. This paper concluded that financial development, more flexible labor market, decrease in power of trade unions and the welfare state savings leads to higher inequality levels over the mentioned period.

Dorn et al. (2018) examined how globalization affects income inequality. This study includes a sample of 140 countries over the period 1970-2014 and used Gini indexes of net income and market income taken from Solt's (2016) Standardized World Income Inequality Database as measures of income inequality. The results support the previous findings in the literature which globalisation and income inequality move in the same direction. Analyzing the measures of globalisation reveals that increase in export volume, direct investments and social globalisation are the main drivers of this relationship. The results changes depending on the type of countries.

When the conflicting theoretical groundings are considered, there are also many empirical studies which examine the effect of the globalization on income inequality for both developed and developing countries. Similar to theoretical studies, the empirical works gives inconsistent results. In a panel data study on 77 countries for the period 1988-1998, Milanovic (2005) find that trade share in GDP as a measure of globalization has a negative effect on the distribution of income. By using an

unbalanced panel of 92 countries in the period 1960-1999, Dollar and Kraay (2002) reveals significant effect of openness measure on the income share of lowest quintile.

Many country specific empirical works found the relationship between trade flows and the relative demand rise for skilled labor and so an increase in the skill premium. However, results of multi-country empirical works depend on the specification and measurement variables. In the literature, there are only a few works which support the Stolper-Samuelson theorem and reveals a decline in income inequality after liberalization of trade. A big part of studies has either no a certain conclusion about the relationship between income distribution and trade openness or obviously no consistent with the standard trade theory. Milanovic and Squire (2005) and Barro (2000) are two examples of increase in income inequality related to trade liberalization.

Since the 90s, there have been various theories about the relationship between FDI and inequality. In addition to the various theoretical studies explaining this relationship, there have been also studies analyzing it empirically. While some works find evidence for harmful effect of FDI, the others explore that FDI decreases income inequality. There are also another part of studies which find statistically significant impact of FDI on distribution of income. The most extensive is the first group which explores that FDI boosts inequality. By conducting a panel work on 88 countries in the period 1967-1994, Alderson and Nielsen (1999) show that increase in FDI stock increases the income inequality. Beer and Boswell (2002) find that the FDI dependency may cause some problems for countries handling with the inequality problem. They also assert that education improves human capital and this contributes to the more equal distribution of income. Reuveny and Li (2003) find that FDI has detrimental distributional effects on income.

In a panel data study on 119 countries in the period 1993-2002, Choi (2006) concludes that the higher FDI stock means the higher income inequality in the recipient country. By analyzing 119 developing countries in the period 1970-1999, Basu and Guariglia (2007) propose that FDI increases income inequality while it supports growth. In their study of 10 countries in the period 1980-200, Herzer and Nunnenkamp

(2011) indicate that FDI has detrimental effect on income inequality only in the short run. In the long run, foreign direct investment decreases the income inequality. Herzer et al. (2013) has a study on Latin America recently and find that FDI increases inequality in the long run.

There have been also several empirical studies on developing countries to investigate the effect of FDI on income inequality which use cross-sectional data and conclude that FDI leads to higher inequality. The best known papers are Feenstra and Hanson (1997) on Mexico, Mah (2002) on South Korea, Zhang and Zhang (2003) on China, Lipsey and Sjöholm (2001) on Indonesia and Nunnenkamp et al. (2006) on Bolivia. According to Feenstra and Hanson (1997), requirement for high-skilled workers increases in the companies which operates internationally and thus, the wages of the skilled workers tend to increase compared with the wages of the unskilled workers

Another part of the empirical works focus on the beneficial effect of direct investments on income distribution. According to Bhandari (2006) which studies on the FDI in the USA and shows that it has equalizing impact but it heterogeneous across states. Jensen and Rosas (2007) find that FDI in Mexico reduces the income inequality in the state level. Chintrakarn et al. (2010) has a similar solution to Bhandari (2006) and find that foreign direct investment in the USA reduces inequality but it is heterogeneous across states.

Third part of the literature does not find a statistically significant relationship between FDI and income inequality. Using data for 56 developing countries, Chase-Dunn (1975) does not find strong evidence for this association. Mah (2003) finds insignificant relation between Gini coefficient and FDI in Korea. In a panel data study on 88 countries in the period 1985-1991, Milanovic (2002) reaches the same insignificant result. By studying on 29 developing countries in the period 1970-1990, Sylwester (2005) reports that there is no evidence about the association between FDI and income inequality.

2.3. Skill-Biased Technological Change (SBTC)

It is obvious that transfer of technology and increased globalization are associated with each other and so technological improvement is accepted to have an separate impact on income inequality.² The technological improvement and total trade openness operates similarly by increasing the skill premium which can be obtained from higher education.

The new technologies in the labor market via imports or exporting firms become good substitutes for unskilled workers and complement with highly educated workers (Borjas, 2010). Because more educated workers can succeed to cope with uncertainties of new technologies and they have an absolute advantage in using IT (Machin and Reenen, 2007). Such evidence shows us that spread of technological changes have contributed to increases in the demand for skilled by decreasing the demand for unskilled labor. In addition to increased demand for skilled labors as a result of above, wages of these workers increased beside it by causing income inequality.

Heckscher-Ohlin Stolper Samuelson theory assumes that all countries have identical technology and absence of economies of scale. If this homogenous production function assumption is released one assumes that developing countries and developed countries have different technological structure, trade openness may make easy transfer of technology from the North (developed countries) to the South (developing countries). This transferred new technologies are probably more skill intensive compared to domestically used technologies before liberalization of trade. In this case, the effect of technology through international openness may refer to a opposite to the HOSS theorem by an increase in wage dispersion as a result of an increase in the demand for skilled labor. This liberalization process concludes with the increase in income inequality (Lee and Vivarelli, 2004).

An obvious example of that is rapid introduction of the personal computer into the workplace. This big change have had an important effect on the wage structure. That

² Even though technological change is seen as an exogenous variable in some parts of the existing literature examining globalization, technological improvement may be investigated as a measure of globalization process.

is, workers that use computers earn more than who do not use. And these workers that use computers are also more highly educated ones (Borjas, 2010). As a result, technological advances such as computers have benefited or rewarded more skilled or educated workers and their wages but they damaged to the wages and employment aspects of less skilled or educated workers. Stiglitz (2002) suggests that trade openness may make worse the income disparity due to the inequalities in participating to the education and skills.

There are two hypothesis to explain the which skill groups are relatively more productive raised by skill biased technological change. Autor, Katz, and Krueger (1999) assumes that groups which have skills that are more complementary with computers are more likely to use computers and get bigger gains in productivity with increasing inventions in computer technology. This is called as the “computer-use-skill-complementarity” version of skill biased technological change. Juhn, Murphy, and Pierce (1991,1993) developed an alternative hypothesis that recent technological changes have increased the relative productivity of highly skilled workers by causing to increases in wage differentials among groups. This approach is called as the “rising-skill-price” hypothesis.

Moreover, the ultimate effect of trade openness on labor demand depends on the skill intensity of the technology which is transferred relative to the currently used technology. Technologies which are transferred is expected relatively more skill intensive than those in use in the domestic country before trade liberalization. As long as technological improvement is connected to liberalization process, trade liberalization may increase skilled labor demand in DCs opposite to the Stolper Samuelson theorem.

Krueger (1993) suggests that computers complements the human capital because highly skilled workers which are especially more educated uses computers relatively more on their jobs. The recent literature on income inequality agree on the belief that the highly skilled workers are demanded relatively more in 1980s and this caused the income inequality to increase. This means that invention of new technologies give rise to increase in demand for skilled workers and a rise in income inequality has

known as “skill- biased technological change (SBTC)” hypothesis (Card and Dinardo, 2002).

Economists generally describe the changes in the labor market structure by taking into account this SBTC hypothesis and focus on transfer of digital technologies. One evidence which points out the computer technology is that income inequality started to increase in the beginning of the 1980s, the first years of the use of microcomputers. Though globalization and SBTC which are biased against the unskilled worker are accepted as complementarity forces, economists don't concur about the importance of globalization on increasing income disparity (Katz and Autor, 1999).

Robbins (2003) has described the technology inflows through trade openness as “skill-enhancing trade hypothesis (SET)”. According to his hypothesis, trade liberalization helps the transfer of high skill-intensive technologies which is currently used in North to the South rapidly.

Conte and Vivarelli (2011) examines the effects of imports of embodied technology on the changes in skill-based employment structure for countries which has different income levels and different sectors for the period 1980-1991. They resulted that for this period, “capital–skill complementarity as a possible source of skill bias, while imported skill enhancing technology occurs as an additional driver of increasing demand for the skilled workers in these countries”.

Economic literature has analyzed the different channels of international technology transfer such as trade and foreign direct investment (Grossman and Helpman, 1990). The relaxation of the HO assumption of homogeneity of technology among countries causes to reconsider the some effects of technology transfer on employment and inequality in developing countries (Acemoglu, 1998; Zhu and Trefler, 2001).

Acemoğlu (1998) found that an exogenous increase in the share of skilled workers or a decrease in the cost of obtaining skills increase wage inequality. The big amount of skilled workers in the labor force constitutes the bigger market for skill

required technologies and in this way productivity of skilled workers increases faster. Increase in the skill amount leads to decline in the skill premium in the short term, but it encourages skill-biased technological change and then skill premium increases, possibly above its first value. These observations are suitable to explain the rise in the amount of college graduates in the United States during the late 1960s and 1970s and then, decrease in the college premium during 1970s and also, a major increase in the wage inequality during 1980s.

Berman and Machin (2000 and 2004) confirmed empirically the spread of SBTC hypothesis and found strong evidence for the increase in demand for skilled labor for manufacturing sectors of developing countries in the 1980s and connect this with skill biased technology. Their findings suggests that SBTC has been transmitted to middle income countries from the developed countries and support the pervasiveness of SBTC.

Card and Dinardo (2000) have examined relative computer use in job on different skill groups which has different education levels in 1984, 1987, 1993, and 1997. They concluded that high school graduates use a computer three or four times more likely on their jobs than dropouts. Under the first hypothesis, these results explore that technological change driven by computer would give rise to a substantial wage differentials related to education. In addition to this, more educated workers gain higher wages and thus, increase in the difference between wages of high and less educated workers is proper to the second hypothesis of SBTC.

From empirical perspective, Conte and Vivarelli (2007) examined the relationship between the technology diffusion and the employment of skilled and unskilled labor for 23 countries including countries which have different income levels comprising 28 manufacturing sectors over a decade. They used the technology transfer as a measure which refers to trade flows of these goods from industrialized countries which includes technological upgrading. The result is that imported skill biased technological change is accepted as one of the factors leading to a rise in relative demand for skilled labor within developing countries in the 1980s.

Behar (2013) investigated the effect of globalization and skill supply on the adoption of technology in favor of skilled workers and demonstrated that the technological change in developing countries is not surely skill-biased, but it is result of the increase in the skill-biased technologies which are developed by advanced countries. This study also discussed that trade openness affects the relative prices of skill-intensive products which has effect on the skill-bias of technological change.



3. THE EMPIRICAL METHODOLOGY AND DATA

3.1. The Data

The analysis starts with the conceptual issues which includes the measurement of globalization and income inequality. Goldberg and Pavcnik (2007) describes globalization as “economic interdependence of countries include flows of goods and services across borders, reductions in policy and transport barriers to trade, international capital flows, multinational activity, foreign direct investment, outsourcing, increased exposure to exchange rate volatility, and immigration”. The studies on the effects of globalization on income inequality has focused on the movement of goods, services and capital across international borders. In their study, Goldberg and Pavcnik (2007) used trade liberalization, outsourcing, flows of capital across borders in the form of FDI, and exchange rate shocks as the components of globalization

The empirical model is derived from the theoretical background to show the impact of globalization on the changes in income inequality. The empirical analysis is based on an unbalanced panel data set including the BRICS countries along with Turkey in the period 1990-2015. Gini index as a measure of income inequality is selected as dependent variable for our panel of BRICS countries and Turkey which are drawn from the Standardized World Income Inequality Database (hereafter, SWIID) , constructed by Solt (2009) to achieve the highest level of harmonization using the Luxemburg Income Study as its standard.³ This dataset has a purpose which combines two important aspects that it has maximum comparability of the data while providing the widest country coverage and time span. The SWIID presents two types of Gini indexes which are based upon gross income and net income after transfers and taxes by using a custom missing-data multiple-imputation algorithm to standardize the observations collected from different sources. In this thesis, the SWIID data source is preferred for income inequality measure as it ensures comparable numbers across

³ The gini index is calculated by multiplying the gini coefficient by 100. It is mostly used to calculate the inequality of income. It takes the value 0 in the case of perfect equality of incomes which everyone has the same income and 100 when one person holds all income and the rest of the population has zero income. Thus, higher value of gini means higher income inequality and lower value

countries and a longer time span. This analysis focuses on the net gini index which describes the income distribution among size adjusted households by taking into account transfers and taxes. The other graphs which displays the heterogeneity of the Gini index values across countries and across years separately and other relevant graphs are presented in Appendix B.

Table 1 represents short definitions and the sources of all the variables used in this analysis. The time covers the years between 1990 and 2015. The time span is limited to the 1990-2015 period due to the reasons: in fact in these years, globalization measured in terms of trade and financial flows recorded a considerable increase in most developing countries.

Table 1
Variable Definitions and Data Sources

Variable name	Definition	Source
Net Gini Index	Gini index after taxes and transfers	Standardized World Income Inequality Database (SWIID)
Total Trade	(Total exports + total imports) as % of total GDP	World Development Indicators database
Import	Imports of goods and service as % of total GDP	World Development Indicators database
Export	Exports of goods and service as % of total GDP	World Development Indicators database
High Technology Exports	High technology exports as % of manufactured exports	World Development Indicators database
Foreign Direct Investment (FDI)	Foreign Direct Investment Inward Stock as % of total GDP	United Nations Conference on Trade and Development
Stock Market Turnover Rate	Ratio of total value of shares to the average market capitalization for the period	Global Financial Development Database

Total Assets and Liabilities	External assets plus liabilities as % of GDP	External Wealth of Nations Database, WEO Database
Capital account openness	The Chinn and Ito (2006) index is an index which measures a country's degree of capital account openness (KAOPEN).	IMF's Annual Report on Exchange arrangements and Exchange restrictions
Gross Fixed Capital Formation	Gross domestic fixed investment as % of GDP	World Development Indicators database
Private Credit	Ratio of total private credits to GDP	Global Financial Development Database
GDP growth	Annual real GDP growth	World Bank's World Development Indicators database
Industrial employment	Share of industrial employment as % of total employment	World Development Indicators database
Labor Force Part. of Females	Economically active females ages 15 and older as % of female population ages 15+	International Labor Organization Database (ILOSTAT)
Population Growth	Annual population growth (%)	World Development Indicators database
Consumer Price Index	Annual average growth rate of consumer prices	World Economic Outlook

This paper uses annual observations for BRICS countries and Turkey. Table 2 presents the descriptive statistics of the relevant variables for BRICS countries and Turkey between 1990 and 2015. It is obviously seen that there is a important difference between maximum and minimum values of net gini index and measures of globalization have . The highest value of Gini coefficient is shown as 59.10, while the lowest is 32.10. The highest level of total trade volume is 110.6, while the lowest is 15.26. In addition, FDI has its maximum value of 47,84, while the lowest level is 0.03. For the financial globalization measures, the highest value of total assets and liabilities as percentage of GDP is 234.1, while the lowest is 29.12. In addition, the highest value of stock market turnover rate is 556.9, while the lowest is 4.15.

Table 2
Descriptive Statistics

Variable		Mean	Std.Dev.	Min	Max	Observations		
Net Gini Index	overall	45.70	6.872	32.80	59.10	N	=	153
	between		6.992	39.17	57.74	N	=	6
	Within		2.330	38.32	49.20	T	=	25.50
Total Trade	overall	42.15	15.26	15.16	110.6	N	=	156
	between		11.99	22.60	54.85	N	=	6
	Within		10.59	13.55	97.87	T	=	26
Import	overall	20.47	7.117	6.962	48.25	N	=	156
	between		5.171	11.40	25.78	N	=	6
	Within		5.313	10.30	45.57	T	=	26
Export	overall	21.67	8.794	6.730	62.32	N	=	156
	between		7.368	11.19	31.69	N	=	6
	Within		5.639	3.253	52.30	T	=	26
GDP Growth	overall	4.466	4.891	-14.53	14.23	N	=	156
	between		3.291	0.726	9.748	N	=	6
	Within		3.851	-10.79	13.74	T	=	26
FDI	overall	15.39	11.07	0.0399	47.84	N	=	152
	between		7.468	6.120	27.76	N	=	6
	Within		8.643	-4.537	36.93	T-bar	=	25.33
Stock Market Turnover	overall	96.14	87.60	4.159	556.9	N	=	150
	between		58.71	22.11	181.1	N	=	6
	Within		69.24	-17.28	572.7	T-bar	=	25
Capital Account Openness	overall	-0.883	0.706	-1.910	1.151	N	=	150
	between		0.474	-1.284	-0.0622	N	=	6
	Within		0.573	-2.731	0.330	T-bar	=	25
Total	overall	87.33	42.58	29.12	234.1	N	=	147

Assets	between		31.26	52.42	128.1	N	=	6
Liabilities	Within		31.72	8.708	193.3	T	=	24.50
Private	overall	57.81	41.83	5.653	146.9	N	=	153
Credit	between		41.64	24.40	118.5	N	=	6
	Within		17.00	-2.974	96.50	T-bar	=	25.50
Gross	overall	24.77	7.674	14.39	45.51	N	=	156
Fixed	between		7.430	18.26	37.58	N	=	6
Capital	Within		3.548	11.75	33.16	T	=	26
Industry	overall	24.61	4.303	14.81	34.35	N	=	150
Employment	between		4.221	18.64	29.48	N	=	6
	Within		1.888	20.27	30.32	T	=	25
Labor	overall	46.88	14.02	23.05	73.20	N	=	156
Force	between		14.90	28.15	68.38	N	=	6
Participat.	Within		3.199	37.89	52.76	T	=	26
Consumer	overall	77.40	343.0	-1.401	2948	N	=	153
Price	between		126.1	4.369	328.5	N	=	6
Index	Within		322.6	-247.9	2697	T-bar	=	25.50
Population	overall	1.119	0.683	-0.460	2.371	N	=	156
Growth	between		0.672	-0.0955	1.651	N	=	6
	Within		0.297	0.594	1.919	T	=	26
High	overall	9.339	7.049	1.000	30.84	N	=	156
Tech.	between		6.189	2.005	20.04	N	=	6
Export	Within		4.191	-5.584	20.14	T	=	26

3.2. The Model

The model establishes a connection with the Gini index and the measures of globalization and a number of control variables, selected based on a literature review in this field. The equation for the specification of the analysis is presented below.

$$Gini_{it} = \beta_0 + \beta_1 GlobalizationVariables + \beta_k X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

where i and t denote country and time period, respectively. *Gini* is Gini index which is relevant income inequality measure for a country i at time t ; *GlobalizationVariables* includes trade globalization measures, the total trade (export plus import as percentage of total GDP), imports of goods and services (% of GDP), exports of goods and services (% of GDP), and financial globalization proxies, FDI inward stocks (% of GDP), total assets and liabilities relative to GDP, stock market turnover rate as a percentage and capital account openness index; X_{it} are a set of control variables; μ_i represents individual and the country-specific time invariant fixed effect and ε_{it} is the standard error term.

Before estimating the panel regression model, the relation between Gini index and each independent variable of the model is portrayed on the scatterplot matrixes to see the general picture. Scatterplots matrixes between net Gini index and each independent variable are sketched separately for the selected countries. Moreover, all the relationships between variables can also be seen in the correlation matrix (See Appendix B for scatterplot matrixes and correlation matrix).

The impact of globalization is analyzed by two sides. Trade globalization includes total trade, import and export and financial globalization covers foreign direct investment, stock market turnover rate, total assets and liabilities and capital account openness.

Financial globalization can distribute the capital efficiently between world countries and support the share of international risk. Freeman (2010) also demonstrated the detrimental effect of financial flow, in particular FDI, on income inequality. Because the foreign assets and liabilities focuses on the sectors which require the high

skilled workers and high technology, this requirement increase the demand for and wages of higher skilled workers. The components of financial openness are total assets and liabilities as percentage of GDP, FDI inward stock, stock market turnover rate, and the capital account openness index (KAOPEN).

As it is mentioned above, FDI is one of the main financial globalization variables and it is measured FDI inward stock as the percentage of total GDP. There are competing sights about the sign of coefficient of FDI. According to Mundell (1957), FDI inflows to developing countries would increase the marginal productivity of labor and then wages which causes the reduction in income inequality. Conversely, Feenstra and Hanson (1997) discuss that FDI into developing countries increases the demand for skilled labor and the wage of skilled labor raises relatively. This coincides with the positive coefficient for FDI. Due to these different theories about the distributional effect of FDI, the sign of coefficient of FDI is ambiguous.

The common discussion on the advantages and disadvantages of trade liberalization generally focuses on the impact of free trade regulations on the structure of labor markets. Until now, the empirical studies has demonstrated different results which shows the impacts of trade openness on structure of employment and earnings. There is an important measurement problem for empirical studies on this issue. As a protection method of non-tariff barriers (NTBs) for several developed and developing countries may be difficult to measure. Therefore, the literature generally uses the total trade, imports plus exports, as the proper measure of trade liberalization to detect the impacts of trade on income. The proper measures of trade liberalization usually employed in the literature are imports, exports, the sum of imports and exports, tariffs etc.

When high trade flows are connected to technological improvements, this process finally drives income inequality. As it is mentioned in previous sections, Feenstra and Hanson (1996, 1999, 2003) proposed that firms in advanced economies have the ability to adopt labor saving technologies and outsourcing which are accepted as an important driver of the decrease in manufacturing and rise in the skill premium.

In this analysis, several control variables are used to determine the other channels which affect the income inequality changes in countries over time and demonstrate substantial changes in the past decades. This thesis uses control variables as technological development, measured by the high technology export to GDP, financial development of country measured by the ratio of total private credit to GDP, gross fixed capital formation, industrial share of employment, labor force participation rate of females, consumer price index.

The skill biased technological change is accepted as a control variable which explains the increases in skill premiums and income inequality within countries. Many empirical studies do not take into account the technology as an alternative factor in explaining the relationship between globalisation and income inequality. In contrast, some studies use Information and Communication Technology (ICT) and Information Technology (IT) investments as proxy for technology. However, globalization shocks may stimulate the investments in new technologies (Bloom et al. 2016). Thus, technology effects of globalization may wrongly blamed for the rise in income inequality.

This analysis uses high technology export as percentage of manufactured exports as proxy for the technological change. To investigate the effect of different human capital endowments of the population on income inequality and skill premium, the human capital index of the Penn-World-Table 9.0. Because this dataset is not stationary and includes unit roots, education from Human Development Report database is selected to encompass the educational differences in the population by analyzing the impact of rising skill premium on income inequality. Because this dataset is also non-stationary, it is dropped and thus, this analysis does not include education related variable.

The other important variable which affects the income inequality is financial development as proxied by the ratio of private credit to the private sector by deposit money banks and other financial institutions to GDP. Households and firms can have lots of benefits which is provided by the financial deepening. They meet easily their financial needs, such education spendings. Financial deepening may lead to allocate the

resources equally and decreases income inequality (Dabla-Norris and others 2015). Greenwood and Jovanovic, (1990) and Roine, Vlachos, and Waldenström (2009) supported the opposite of this argument and they pointed out that financial deepening benefit the individuals which have high income levels.

Another factor which affects the income distribution is the industrial share of employment. Low income group of worker could benefit from the shift from agricultural sector to industry by increasing their incomes in developing countries. In addition, increase in labor market flexibility enables to have better job opportunities which provide higher incomes (Topalova, 2007). In addition, rise in the relative productivity of agriculture increases the incomes in this sector and thus it is expected to decrease income disparities.

As a control variable, labor force participation rate of females are added to the model. There are mixed literature about the impact of it on income inequality. Female labor force participation inflates the bottom of the income distribution because of the lower average earnings of women and boosts the advantage of high income households and the disadvantage of poor households when married couples work. This has contributed to the increase in inequality. In summary, according to Thurow, female labor force participation is related to the greater income inequality among households. The second argument which is proposed by Nielsen and Alderson (1997) focuses on the rise in the share of households headed by women. They found that if the number of households headed by women increases, this, of course, increase the income inequality.

To explain the increased income inequality between 1968 and 1988, Cancian, Danziger, and Gottschalk (1991) focused on the changes in the distribution of income among married couples. They examined that how changes in income level of couples affect the family income. They resulted that the increased inequality in the husbands' earnings distribution is the primary factor which contributes to rise in the income inequality. Conversely, earnings of spouses increased family income and decreased

inequality. More female labor participate means more incomes for the families near the middle income share and this leads to a decrease in the income inequality.⁴

Consumer price index is included to the model as a control variable to check for the macroeconomic environment because it has distributional effect on income. Since developing countries have often high level of macroeconomic instable conditions, inclusion of this variable is crucial for them. Inflation corrodes real wages and the bottom part of the income distribution is affected disproportionately and finally, inequality increases. Lots of papers reveals that high inflation is related with the higher inequality. Ferreira and Litchfield (1998) find a positive relationship between inflation and income inequality for Brazil.

Finally, a dummy variable is used to test for the possible effects on income inequality arising from crisis situations. It takes value of 0 for the years before 2008 and the value of 1 for the years covering 2008 and later.

3.3. The Empirical Methodology

The structure of the data set is an unbalanced panel, with different numbers of observations over time for different countries. This type of data is appropriate for the use of estimation techniques which overcome with the possible heterogeneity bias, or the unclear impact of unmeasured time-invariant variables that are omitted from regression models of income inequality (Baltagi 1995; Hsiao 1986). The OLS coefficient estimates can be affected by heterogeneity bias. To eliminate this, the fixed-effects and random effects models are commonly used to correct the unmeasured time-invariant factors.

The theoretical model which is explained above in detail is estimated by using panel data techniques. In order to analyze the stationary properties of the relevant variables, the analysis starts with performing the panel unit root tests. Unit root tests are used to approve the stationarity of selected variables. Several unit root tests are taken into account and because the panel is unbalanced and includes missing years for the lots of

⁴ As a support for this interpretation, Nielsen and Alderson (1997) found that more female labor force affected negatively the income inequality of U.S. countries in the years 1980 and 1990.

variables, the augmented Dickey-Fuller test (ADF) is implemented to the relevant variables to test their stationarity ⁵. The null hypothesis of the test is that each series in the panel dataset contains a unit root while the alternative hypothesis is that at least one of the individual series in the panel is stationary. The results are reported in Appendix C.

The results of the unit root tests reveals that some series are stationary and others are non- stationary. By eliminating the non- stationary datasets, the analysis continues with the determination of which model will be used within the panel data analysis. The appropriateness of OLS, fixed effects model, or random effects model is detected by two specification tests in the context of panel estimation. Estimation of the model starts with the pooled OLS regression. In all the models estimated, for the purpose of choice between between a random effects regression and a simple OLS regression, Breusch and Pagan's (1980) Lagrange multiplier test under the null hypothesis of pooled OLS versus the alternative the random effects is used. The null hypothesis Breusch and Pagan Lagrangian multiplier test for random effects test results show Prob> chi2 = 1.0000 and given that the score is greater than 0.05, the pooled OLS model is selected. Test results is presented in the following Table 3.

⁵ Because the high technology export variable contains missing values more than 5 years, this missing cells are linearly interpolated in Stata and thus, Levin, Lin and Chu (2002) unit root test is used to test this balanced panel.

Table 3**Breusch and Pagan Lagrangian multiplier test for random effect**

Breusch and Pagan Lagrangian multiplier test for random effects		
$netgini[pid,t] = Xb + u[pid] + e[pid,t]$		
Estimated results:		
	Var	sd = sqrt(Var)
Netgini	44.97728	6.706511
E	2.176395	1.475261
U	0	0

Test:	Var(u) = 0	
	chibar2(01) =	0.00
	Prob > chibar2 =	1.0000

Source: Author's Calculation

The simplest poolability test which allow us to decide between pooled OLS and fixed effect (FE) has its null hypothesis the pooled OLS model: $y_{it} = a + b'X_{it} + \varepsilon_{it}$ and as its alternative the FE model: $y_{it} = a + b'X_{it} + \mu_i + \varepsilon_{it}$. In other words, the presence of individual effects is tested under the null hypothesis $H_0: \mu_i = 0, i = 1, \dots, N$. In Stata, when fixed effect is implemented, the F-test that all $\mu_i = 0$ is obtained at the bottom of the output. The result obtained in Stata is Prob > F = 0.0000 and demonstrate the rejection of the null hypothesis that all μ_i are zero. This result means that the OLS estimator is biased and inconsistent and the presence of the individual effects is accepted. Test results are shown in Table ... in Appendix C.

Next, Hausman test is run to decide between random-effects model and a fixed-effects one. In fact, this test is performed in order to test whether country-specific individual effects are correlated with the explanatory variables. In all models where it could be performed, Hausman's (1978) test of random effect versus fixed effect gave the results in favor of fixed effects model. The probability is 0.0000 and given that the score is less than 0.05, so it rejects the null hypothesis that individual effect are random and this random effect ensures consistent estimates. The result concludes that

the Fixed effect model fit the data well. Hausman test results are presented in TABLE 4 in below.

Table 4
The Hausman Test

---- Coefficients ----				
	(b) fixed	(B) Random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Trade	.1387283	.2576799	-.1189516	.
Fdi	-.063366	.1944502	-.2578162	.
Gdpgrw	.0016601	-.1376723	.1393324	.
Cap	.0571928	-.442116	.4993088	.
Ind	-.5213055	-.3915097	-.1297958	.
Labforce	-.2527402	.0469574	-.2996977	.0336415
Cpi	.0012166	.0045125	-.0032959	.
Popgrw	-1.15656	7.972847	-9.129408	.4629274
ihightechper	.021678	.4421078	-.4204298	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\text{chi2}(9) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 384.32$$

Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

Source: Author's Calculation

After this step, post estimation tests is implemented to the data and results reveal the presence of cross sectional dependency and heteroskedasticity. In the context of panel data analysis, it is essential to check for cross sectional dependency and heteroscedasticity. For this purpose, the analysis starts with the detection of heteroscedasticity. In the presence of heteroskedasticity, the standard errors of the estimates become biased and it is necessary to calculate robust standard errors which correct for the possible presence of heteroskedasticity.

The fixed-effects regression model invokes the ordinary least squares (OLS) estimator under the classical assumptions that the error process is independently and identically distributed. Also, the fixed effect regression model estimates this model under the homoskedasticity assumption. In panel data context, these assumptions may be violated in different ways. In the context of pooled cross-section time-series data (or panel data) , the most possible deviation from homoskedastic errors is likely to be specific error variances for the cross sectional units. Homoskedastic error process within cross sectional units and changed variance across units is known as groupwise heteroskedasticity (Baum, 2001).

The modified Wald statistic is calculated for groupwise heteroskedasticity in the residuals of a fixed-effect regression model. The null hypothesis assumes that $\sigma^2_i = \sigma^2$ for $i = 1, \dots, Ng$, where Ng is the number of cross-sectional units. The statistic of this test is distributed Chi-squared under the null hypothesis of homoskedasticity. After the fixed effects regression, a modified Wald test is performed for groupwise heteroskedasticity in the fixed effect model, implemented in Stata. The result is $\text{Prob} > \chi^2 = 0.0000$ and this indicates rejection of the null hypothesis of homoskedasticity. The modified Wald statistic test result is presented below in Table 5.

Table 5

The Heteroscedasticity Test

Modified Wald test for groupwise heteroskedasticity

in fixed effect regression model

$H_0: \sigma^2(i) = \sigma^2$ for all i

$\chi^2(6) = 90.03$

$\text{Prob} > \chi^2 = 0.0000$

Source: Author's Calculation

A major part of the panel data literature concludes that panel-data models probably exhibit substantial cross-sectional dependence in the errors. This may arise from the reason that over the last few decades countries and financial institutions have experienced continuous increase in economic and financial integration, which allows strong relations between cross-sectional units.

Cross-sectional dependence means the violation of the assumption of independently and identically distributed errors context of contemporaneous correlation of errors across cross-sectional units. It is concluded that testing for cross-sectional dependence is important to fit the panel-data models. Because time T is greater than N , the Lagrange multiplier (LM) test which is developed by Breusch and Pagan (1980) is used under the null hypothesis of cross-sectional independence versus the alternative the cross-sectional dependence. The hypothesis of this test is that the residual correlation matrix which is calculated on common observations in all cross-sectional units is an identity matrix of order N_g , where N_g represents the number of cross-sectional units (Baum, 2001).

After all the fixed effects regressions, Breusch and Pagan Lagrange multiplier (LM) test for cross-sectional dependency is implemented in Stata. The result is Prob = 0.0000 and this indicates rejection of the null hypothesis of cross-sectional independence. Table 6 presents the result in details.

Table 6
Breusch-Pagan LM test for Cross Sectional Dependency

Correlation matrix of residuals:						
	__e1	__e2	__e3	__e4	__e5	__e6
__e1	1.0000					
__e2	-0.4409	1.0000				
__e3	-0.4409	-0.1316	1.0000			
__e4	0.2736	-0.1268	0.1923	1.0000		
__e5	-0.2203	-0.0703	0.7782	0.0866	1.0000	
__e6	0.5282	0.1044	-0.7761	-0.1785	-0.3602	1.0000
Breusch-Pagan LM test of independence: chi2(15) =					52.905, Pr = 0.0000	
Based on 19 complete observations over panel units						
Source: Author's Calculation						

In this analysis, two problems arise in the model: heteroskedasticity and cross sectional dependence. A simpler method for estimation of this type of panel models is panel-corrected standard errors (PCSE). Although OLS estimates of parameters in panel data model may not be optimal, they often perform well in research studies. This leads to highly inaccurate OLS estimators for standard errors. Therefore, it is suggested to keep OLS parameter estimates but replace the OLS standard errors with panel-corrected standard errors. This correction considers the contemporaneous correlation of the errors. The important point is that this suggested method works only inside the panel data context (Beck and Katz, 1995).

To estimate the model by taking into account these two problems, Beck and Katz (1995) suggest to rely on the OLS coefficient estimates with panel-corrected standard errors (PCSEs). Beck and Katz (1995) show that large T based standard errors which correct for contemporaneous correlation between the subjects exert well in small panels. Beck and Katz (1995) proposed to estimate linear models of panel data by ordinary least squares (OLS) and they suggested the full $N \times N$ cross-sectional

covariance matrix of the estimated parameters, which they called “panel-corrected standard errors (PCSE)”. It should also be emphasized that the term of panel-corrected demonstrates that the standard errors which is computed will not be inaccurate because of the panel structure of the data (Hoechle, 2007).

Since aim of this analysis is to study the performance of panel corrected standard errors in case of the incorrect OLS standard errors, experiments are designed with contemporaneously correlated and/or panel-heteroscedastic error structures which are associated with the panel structure of the independent variables. In panel-corrected standard error (PCSE) estimates for panel models, the parameters are estimated by either OLS or Prais–Winsten regression. All regressions are estimated with panel corrected standard errors method and regression results are presented in following section.

4. EMPIRICAL RESULTS

This section is followed by the analysis of the relationship between different components of trade and financial globalization and income inequality. Other explanatory variables included in the estimations are the GDP growth, credit to the private sector, gross fixed capital formation, industry employment share, female labor force participation, consumer price index, population growth, high technology export and crisis dummy. The analysis focuses on the globalization related changes in income inequality over time and controls for country specific differences by using country fixed effects.

The dependent variable in all regressions is the Gini Index, therefore a positive coefficient indicates a rise in income inequality. Every trade globalization variable is included in the model with each financial globalization variable separately and all control variables are included together with this globalization variables in all regressions. Table 7 presents total trade as trade liberalization variable with the four financial liberalization variable and all control variables. All regressions in Table 7 shows that the coefficient estimate of total trade is positive and statistically significant. This suggests that an increase in the total trade volume of the country results with the higher income inequality. In terms of the financial globalization, it is observed that FDI and total assets and liabilities are insignificant. In addition, financial integration measured by stock market turnover rate and capital account openness are significantly negative to income inequality in all models. That is, stock market turnover rate and capital account openness have decreasing impact on income inequality. This implies that as countries financially integrate into the world economy more, income inequality declines. This result approves the hypothesis of Mundel (1957) that capital flows would increase the marginal productivity of workers in the recipient country and it would result in the increase in the income level of the poor workers and would end in narrow income gap.

All of the control variables in the all regressions, except for GDP growth are found to be statistically significant. First, technological improvement and domestic financial deepening increases inequality significantly. These results are consistent with

the above mentioned discussion that technological improvements rises the demand for skilled labors and that the increased financial deepening benefits disproportionately the rich more than poor. The coefficient of technological improvement and domestic financial deepening are both significant at the 1 percent level in all regressions. The share of industry employment has equalizing impact on inequality and this is consistent with the literature that the productivity in the agricultural sector which employs relatively poor increases while productivity in industry decrease. Finally, the coefficient estimate of crisis dummy is also negative sign and statistically significant only for the first two models suggesting that the crisis leads to a more equal income distribution.

Table 7

Fixed-Effect (within) Regression with Panel Corrected Standard Errors

Dependent variable: gini index				
Variables	Reg1	Reg2	Reg3	Reg4
<i>Trade Globalization variables</i>				
Total Trade	0.106*** (0.03)	0.089*** (0.03)	0.089** (0.04)	0.093*** (0.03)
Import				
Export				
High Tech. Export	0.330*** (0.06)	0.287*** (0.05)	0.341*** (0.05)	0.344*** (0.05)
<i>Financial Globalization variables</i>				
FDI	0.047 (0.04)			
Stock Market Turnover		-0.008*** (0.00)		
Total Assets and Liabil.			-0.003 (0.01)	
Capital Account Openn.				-1.108**

(0.45)

Control variables

GDP Growth	-0.080 (0.06)	-0.091 (0.06)	-0.078 (0.06)	0.011 (0.08)
Private Credit	0.097*** (0.01)	0.103*** (0.01)	0.111*** (0.01)	0.099*** (0.01)
Gross Fixed Cap. Form.	-0.519*** (0.06)	-0.484*** (0.06)	-0.569*** (0.05)	-0.623*** (0.05)
Industry Empl. Share	-0.422*** (0.11)	-0.366*** (0.10)	-0.431*** (0.13)	-0.385*** (0.11)
Female Lab. Force Part.	-0.154*** (0.04)	-0.153*** (0.04)	-0.177*** (0.04)	-0.163*** (0.04)
Consumer price index	0.004*** (0.00)	0.005*** (0.00)	0.004*** (0.00)	0.004*** (0.00)
Population Growth	2.445*** (0.84)	2.137*** (0.74)	1.685* (0.96)	2.113*** (0.76)
Dummy	-1.335** (0.66)	-1.231** (0.63)	-0.725 (0.70)	0.068 (0.82)
Constant	60.082*** (3.84)	60.573*** (3.21)	64.235*** (4.47)	61.830*** (3.33)
Diagnostics				
Number of obs	144	143	140	142
R-squared	0.829	0.836	0.832	0.837

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Next, Table 8 and Table 9 perform a robustness check to break down the effects of exports and imports which are hidden within the openness variable. All regressions are estimated with import as the trade globalization measure by adding financial globalization variables one by one in Table 8. All regressions show the coefficient estimate of import as positive sign and statistically significant. This suggests that if these countries open their economies, they are exposed to more advanced technologies and innovations produced in the developed countries. These technologies involve the increase in demand for skilled labor and a consequent increase in income differentials

and thus, an increase in income inequality. The sign and significance of other financial globalization variables and all control variables do not change in all regressions when the import variable is included in the model. The insignificance of the GDP growth continues in all regressions.

Table 8

Fixed-Effect (within) Regression with Panel Corrected Standard Errors

Dependent variable: gini index				
Variables	Reg1	Reg2	Reg3	Reg4
Trade Globalization variables				
Total Trade				
Import	0.308*** (0.07)	0.302*** (0.07)	0.306*** (0.08)	0.311*** (0.07)
Export				
High Tech. Export	0.355*** (0.06)	0.313*** (0.06)	0.364*** (0.05)	0.364*** (0.05)
Financial Globalization variables				
FDI	0.031 (0.03)			
Stock Market Turnover		-0.007** (0.00)		
Total Assets and Liabil.			-0.008 (0.01)	
Capital Account Openn.				-1.105*** (0.43)
Control variables				
GDP Growth	-0.070 (0.06)	-0.097 (0.06)	-0.074 (0.06)	-0.017 (0.07)
Private Credit	0.089*** (0.01)	0.091*** (0.01)	0.102*** (0.01)	0.086*** (0.01)
Gross Fixed Cap. Form.	-0.568*** (0.05)	-0.523*** (0.06)	-0.619*** (0.06)	-0.647*** (0.05)

Industry Empl. Share	-0.484*** (0.11)	-0.445*** (0.09)	-0.520*** (0.12)	-0.455*** (0.10)
Female Lab. Force Part.	-0.104** (0.04)	-0.089** (0.04)	-0.119*** (0.04)	-0.097** (0.04)
Consumer price index	0.005*** (0.00)	0.005*** (0.00)	0.005*** (0.00)	0.004*** (0.00)
Population Growth	2.508*** (0.76)	2.499*** (0.69)	1.769* (0.94)	2.441*** (0.68)
Dummy	-1.279** (0.63)	-1.221** (0.61)	-0.658 (0.67)	-0.018 (0.78)
Constant	58.979*** (3.60)	58.011*** (3.17)	63.064*** (4.34)	58.955*** (3.26)
Diagnostics				
Number of obs	144	143	140	142
R-squared	0.839	0.847	0.842	0.848

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Finally, the analysis continues by re-estimating all regressions adding export as trade globalization measure. The results of this analysis are presented in Table 9. Again starting from the general model (Reg1) and adding financial globalization variables one by one, the results does not change for all other variables except export variable. The coefficient of it is positive and statistically significant only for the first regression. This means that exports do not affect income inequality at all. Trade with richer countries which involves technological upgrading shifts labor demand towards more skilled workers and the final consequence is the rise in income inequality. The sign of coefficient and significancy of all other finacial and control variables are the same as previous regressions. GDP growth is still insignificant in all regressions.

Table 9

Fixed-Effect (within) Regression with Panel Corrected Standard Errors

Dependent variable: Gini Index				
Variables	Reg1	Reg2	Reg3	Reg4
Trade Globalization variables				
Total Trade				
Import				
Export	0.099* (0.06)	0.052 (0.05)	0.041 (0.06)	0.062 (0.05)
High Tech. Export	0.322*** (0.05)	0.283*** (0.05)	0.338*** (0.05)	0.343*** (0.05)
Financial Globalization variables				
FDI	0.047 (0.04)			
Stock Market Turnover		-0.010*** (0.00)		
Total Assets and Liabil.			0.006 (0.01)	
Capital Account Openn.				-1.168*** (0.45)
Control variables				
GDP Growth	-0.074 (0.06)	-0.079 (0.06)	-0.077 (0.06)	0.036 (0.07)
Private Credit	0.108*** (0.01)	0.116*** (0.01)	0.118*** (0.01)	0.112*** (0.01)
Gross Fixed Cap. Form.	-0.508*** (0.06)	-0.472*** (0.06)	-0.542*** (0.05)	-0.627*** (0.06)
Industry Empl. Share	-0.339*** (0.12)	-0.272** (0.11)	-0.315** (0.14)	-0.297*** (0.11)
Female Lab. Force Part.	-0.208*** (0.04)	-0.212*** (0.04)	-0.226*** (0.04)	-0.222*** (0.04)
Consumer price index	0.004*** (0.00)	0.005*** (0.00)	0.004*** (0.00)	0.003*** (0.00)

Population Growth	1.764** (0.86)	1.311* (0.73)	1.269 (0.95)	1.331* (0.77)
Dummy	-1.535** (0.67)	-1.491** (0.62)	-1.114 (0.70)	-0.078 (0.83) (0.45)
Constant	62.913*** (3.87)	63.777*** (3.12)	65.335*** (4.53)	65.108*** (3.25)
Diagnostics				
Observations	144	143	140	142
R-squared	0.822	0.831	0.827	0.832

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1



5. CONCLUSION

Since 1980s, international trade has developed and financial flows between countries has increased with the third globalization wave. Income inequality has also increased in this period. There have been lots of theoretical and empirical studies to investigate the association between these two concept, globalization and income inequality.

This thesis examined the relationship between income inequality which is measured by the net Gini Index and globalization which used trade and financial variables as its proxy for the BRICS countries and Turkey in the period 1990-2015. The main purposes are to demonstrate evolution of trade and financial globalization over the past three decades and to find the channels which globalization performs and has effect on distribution of income. The empirical analysis used the appropriate panel data techniques to explain this connection.

From theoretical perspective, if the HOSS assumption of same technological level across countries is relaxed, the technology diffusion across developing countries through import and export flows can foster as a result of the rise in the integration of international markets. The technologies transferring from more advanced countries are relatively more skill intensive as compared to the domestically used technologies in the developing countries. Thus, trade related technology upgrading may shift the labor demand in favor of skilled labor, resulting in a general rise in the skill premium and hence in a more unequal income distribution.

The econometric results demonstrates that the impact of globalization on income inequality reflects two offsetting tendencies: while trade globalization through exports and imports is associated with a rise in income inequality, financial globalization measured with stock market turnover rate and capital account openness index has equalizing effect on distribution of income for these countries since 1990. A key finding of this thesis is that in spite of the extensive literature about the positive impact of FDI on developing countries' income inequality, the study reveals statistically insignificant impact of FDI for these countries.

Easterly (2001) and Stiglitz (2002) explain that the third wave of globalization does not give the expected results which is compatible with the HOSS theory predictions. Indeed, increasing trade do not automatically assure a decrease in within country income inequality. As opposed to this hypothesis, the rise in trade volume increases income inequality. In fact, disparities in the distribution of incomes probably arises from the detrimental effects of the skill-biased technological change.

Among the control variables, private credit, population growth and consumer price index has disequalizing impact whereas labor force participation of females, gross fixed capital formation and industry employments share has statistically negative impact on income distribution. Finally, the use of a dummy variable to capture changes in income inequality, as a result of the financial crisis has also equalizing impact.

APPENDIX A

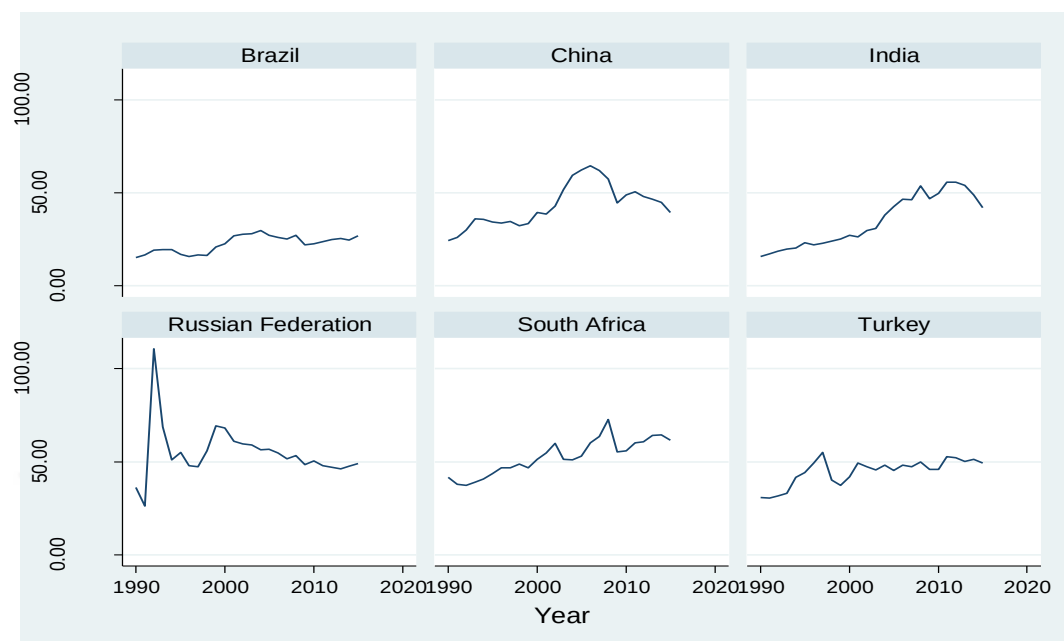


Figure A1: Trade Openness (ratio of total trade to GDP) Between 1990-2015

Source: World Bank's World Development Indicators Database (WDI)

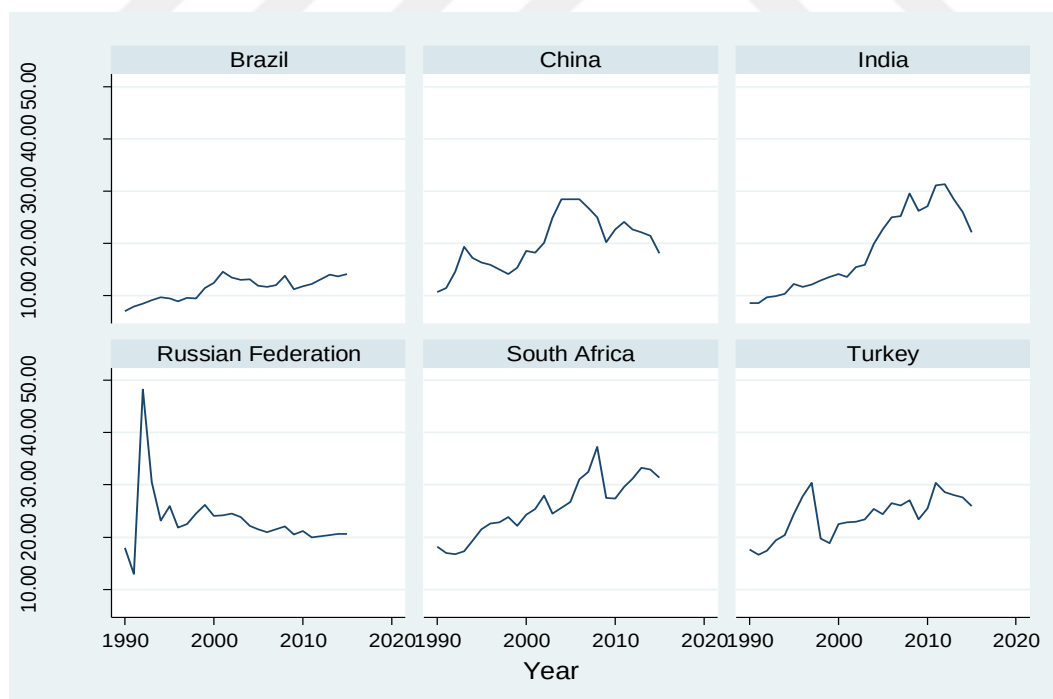


Figure A2: Trade Openness (ratio of imports to GDP) Between 1990-2015

Source: World Bank's World Development Indicators Database (WDI)

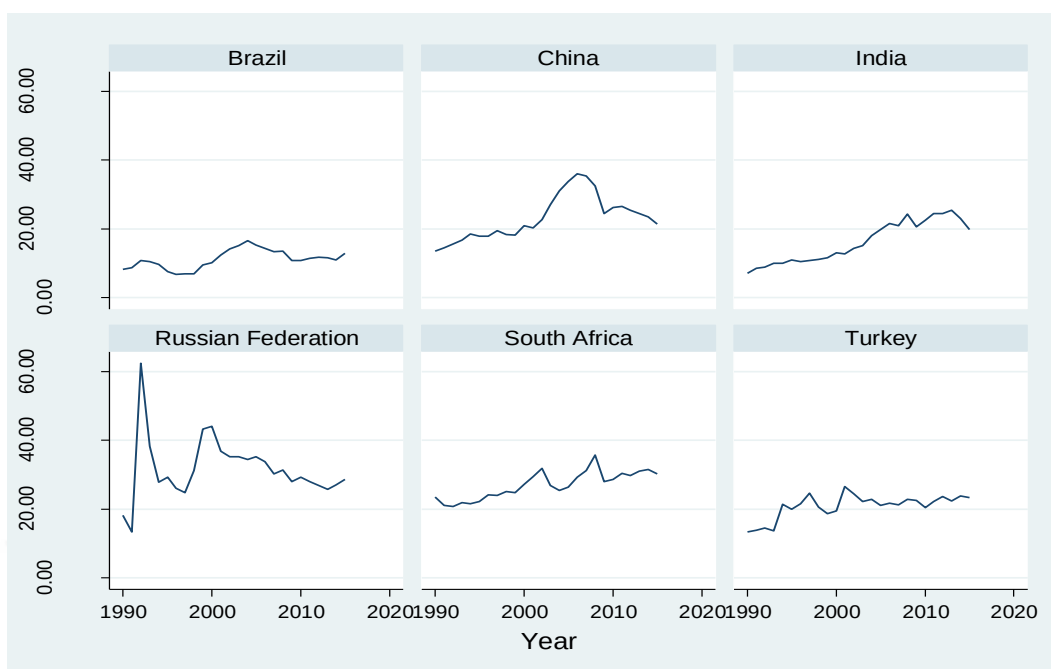


Figure A3: Trade Openness (ratio of exports to GDP) Between 1990-2015

Source: World Bank's World Development Indicators Database (WDI)

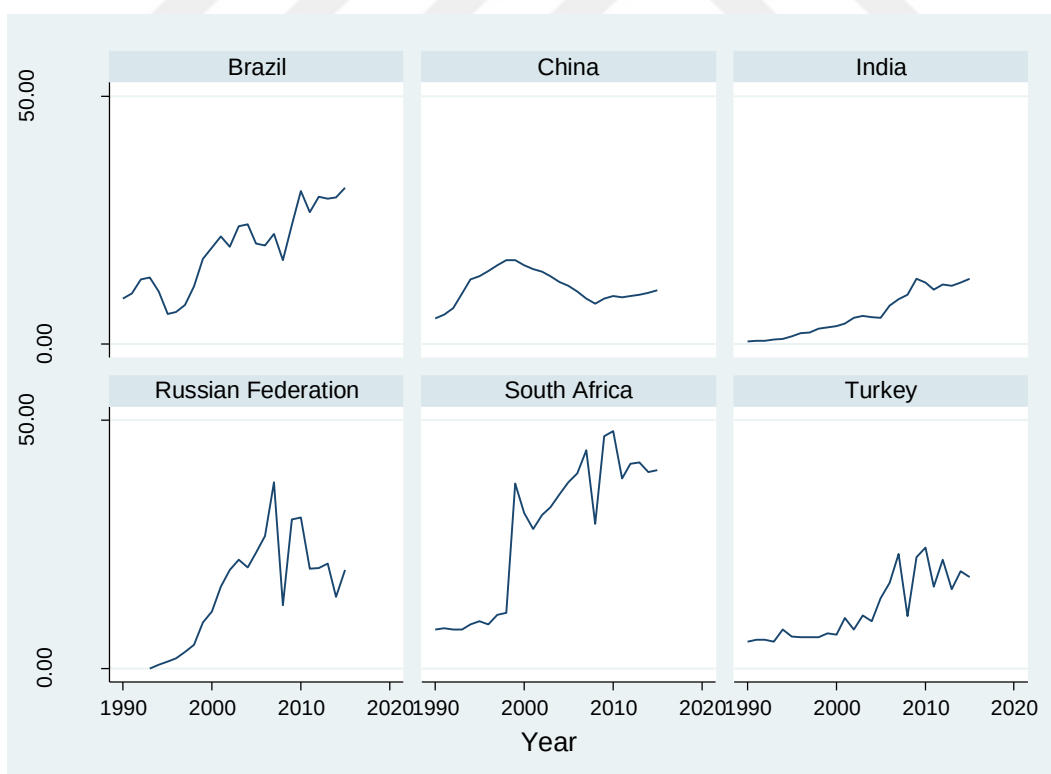


Figure A4: Financial Openness (ratio of FDI inward stock to GDP) Between 1990-2015

Source: UNCTAD

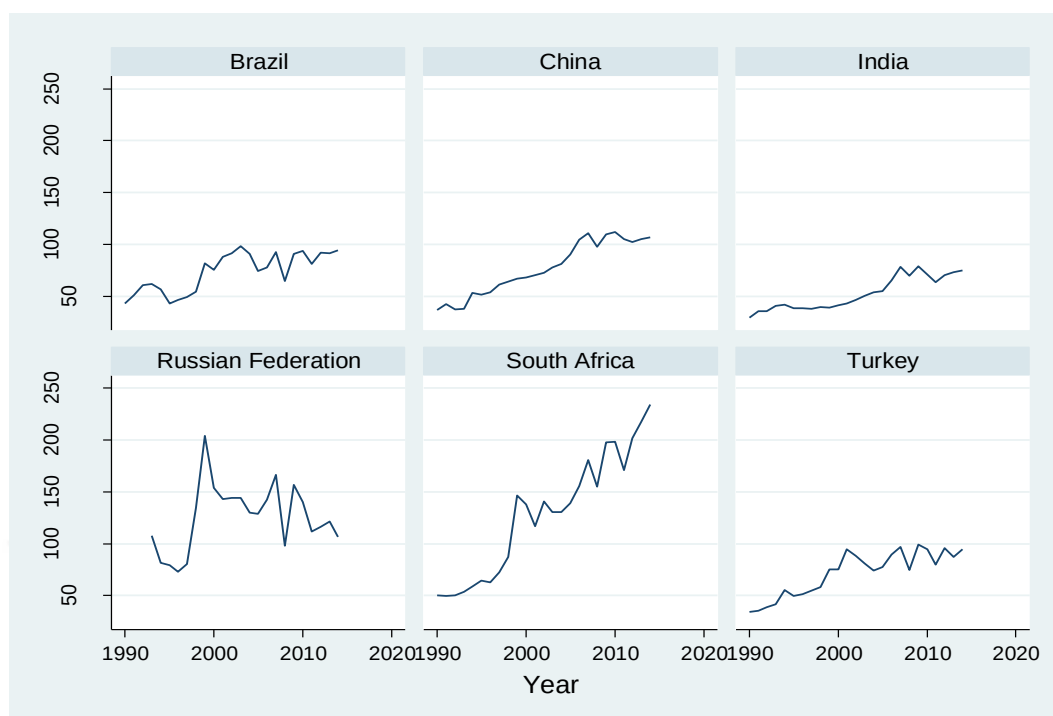


Figure A5: Financial Openness (ratio of total assets and liabilities to GDP) Between 1990-2015

Source: External Wealth of Nations Database, World Economic Outlook Database (WEO)

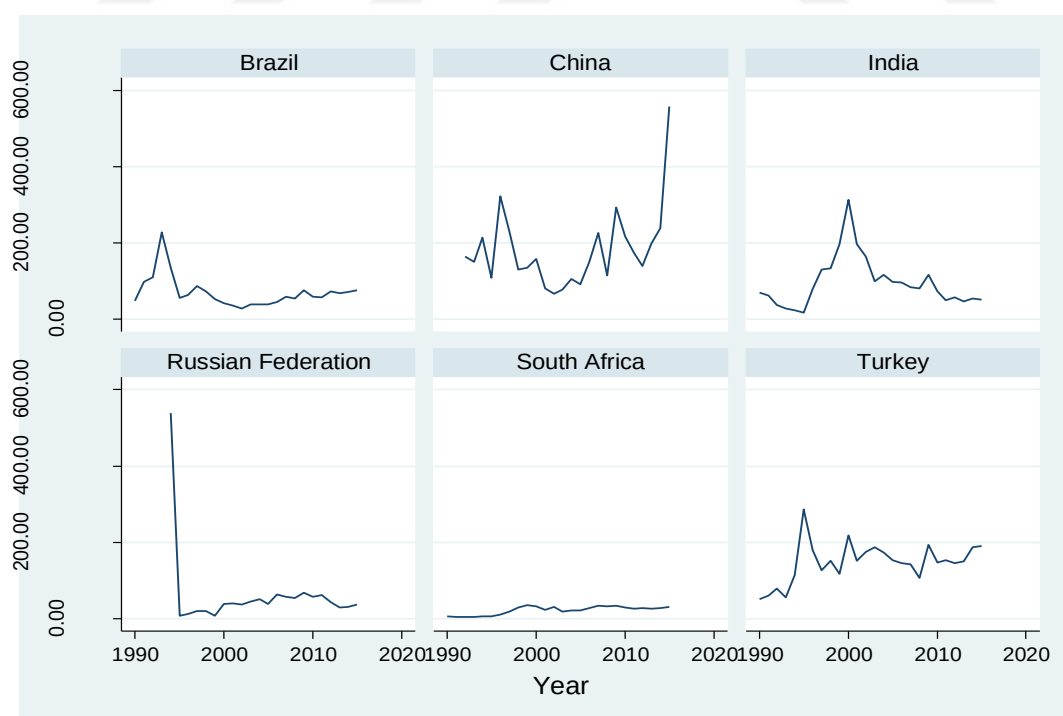


Figure A6: Financial Openness (stock market turnover rate) Between 1990-2015

Source: World Bank's Global Financial Development Database

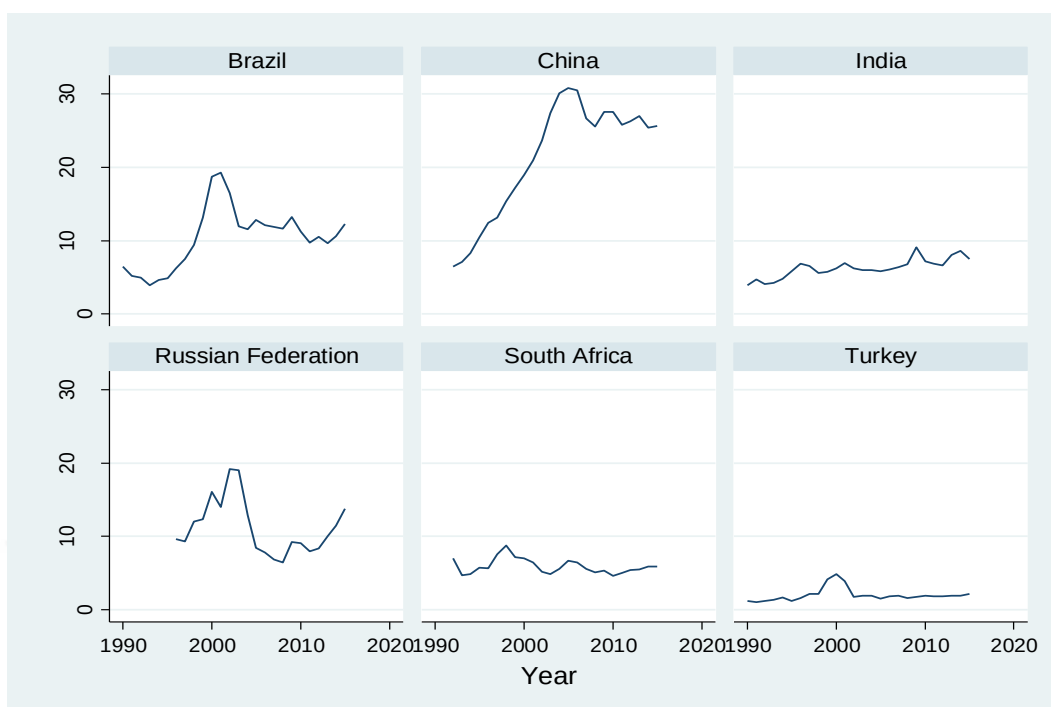


Figure A7: High Technology Export Between 1990-2015

Source: World Bank's World Development Indicators Database (WDI)

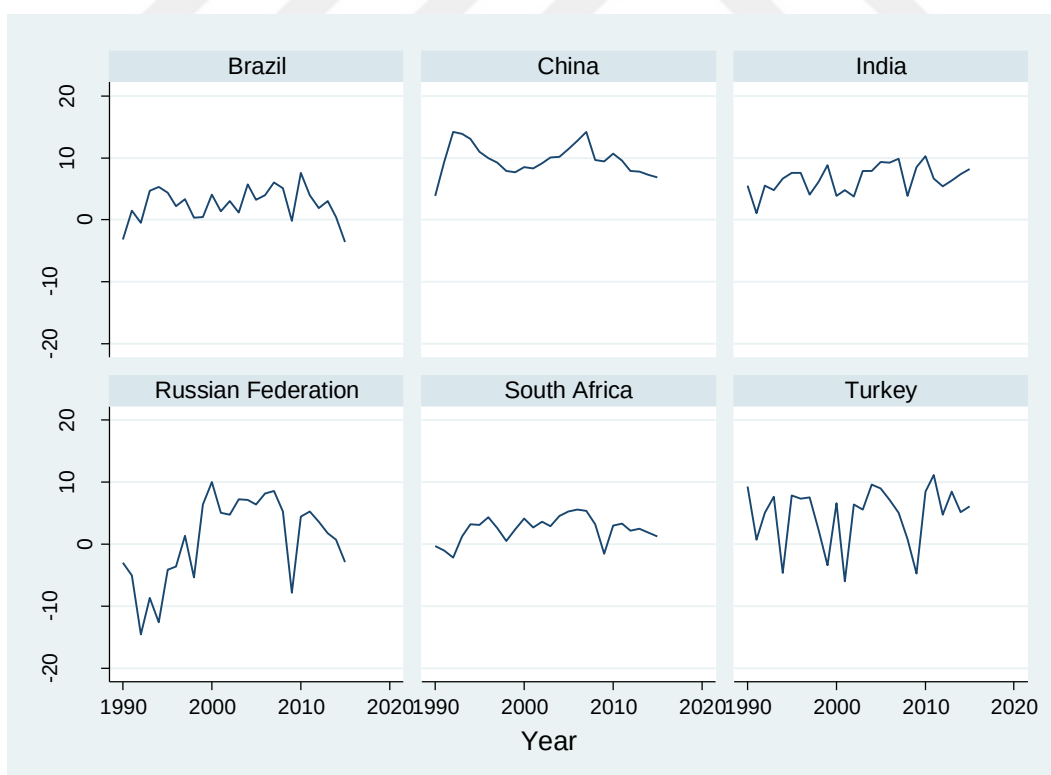


Figure A8: GDP Growth Between 1990-2015

Source: World Bank's World Development Indicators Database (WDI)

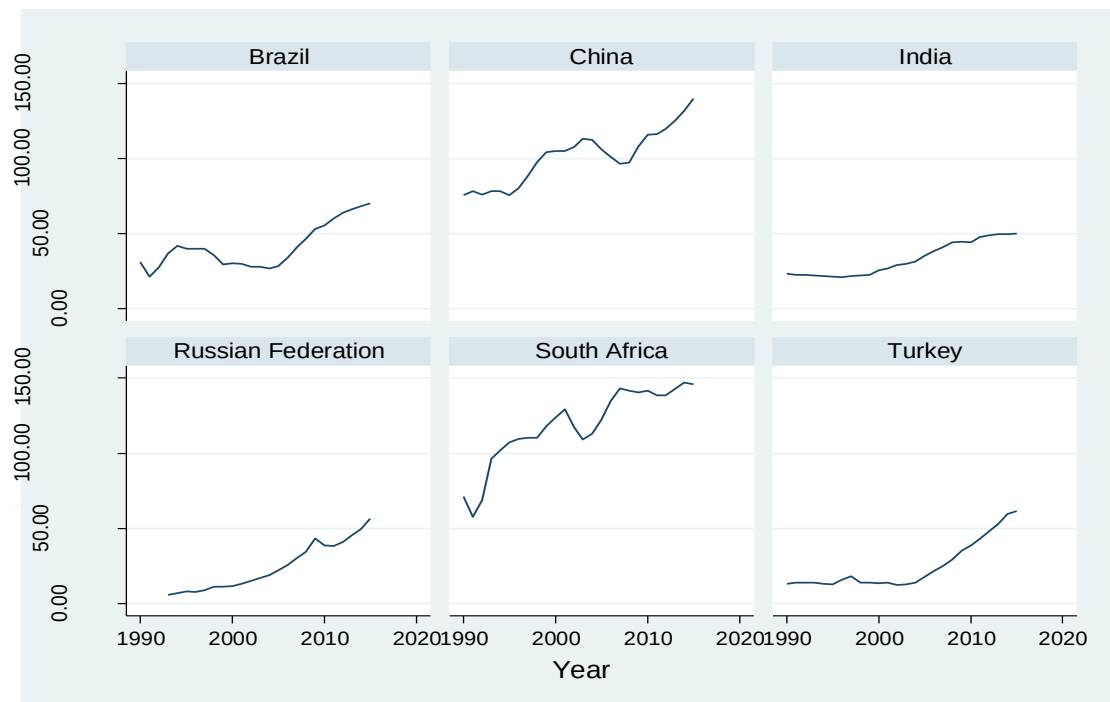


Figure A9: Private Credit Between 1990-2015

Source: World Bank's Global Financial Development Database

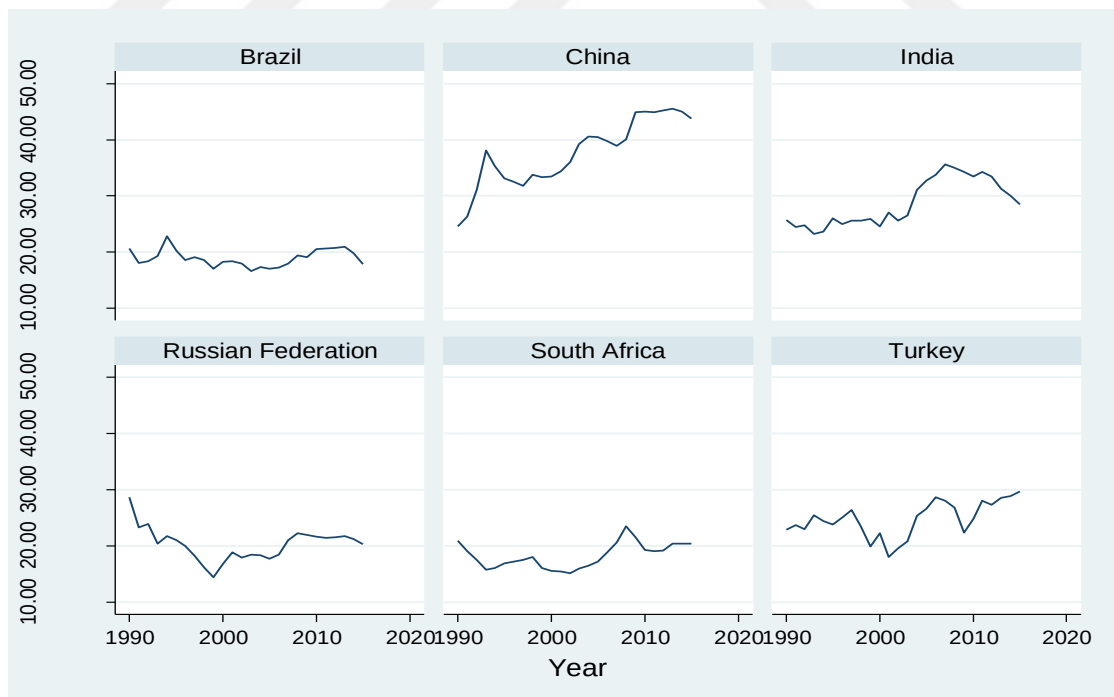


Figure A10: Gross Domestic Fixed Investment Between 1990-2015

Source: World Bank's World Development Indicators database

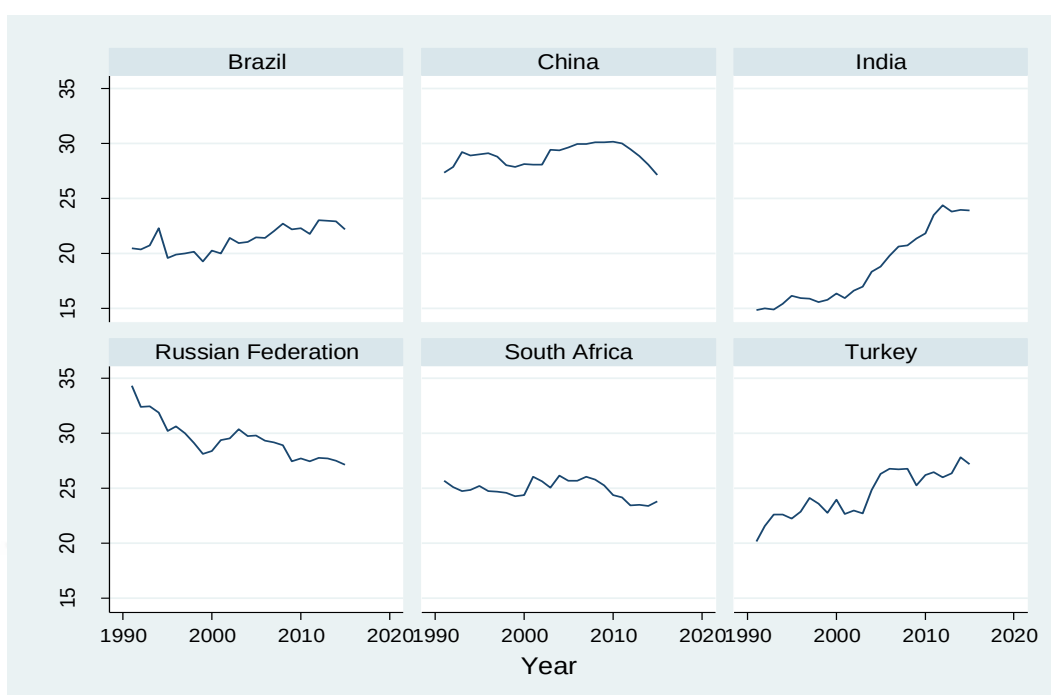


Figure A11: Industrial Employment Between 1990-2015

Source: World Bank's World Development Indicators database

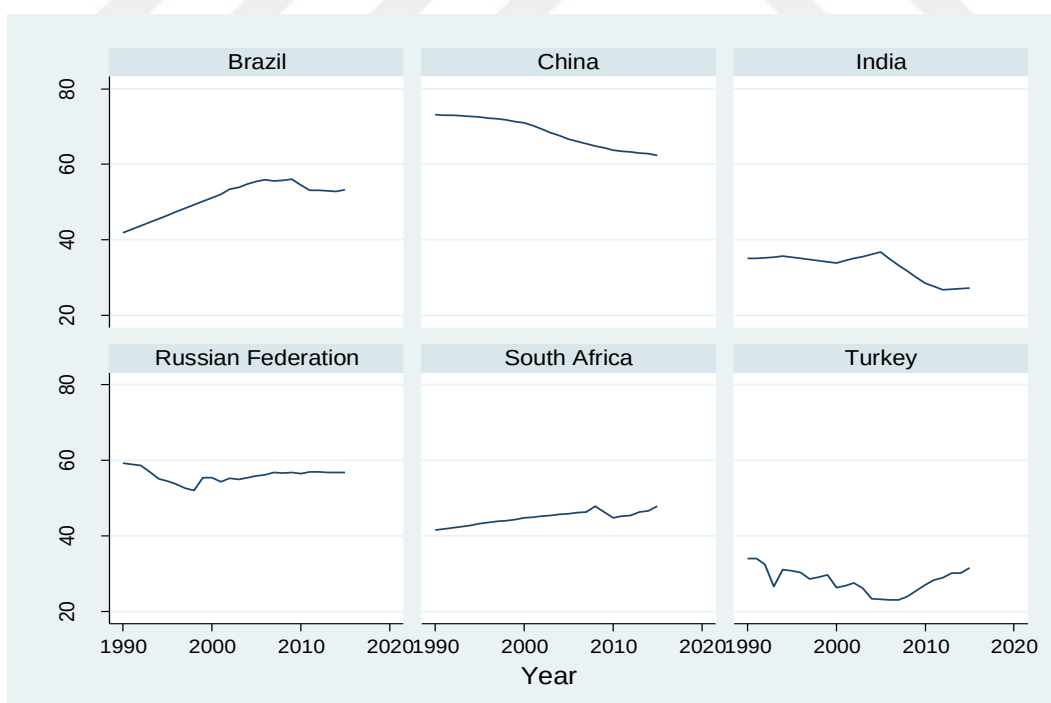


Figure A12: Labor Force Participation of Females Between 1990-2015

Source: International Labor Organization Database (ILOSTAT)

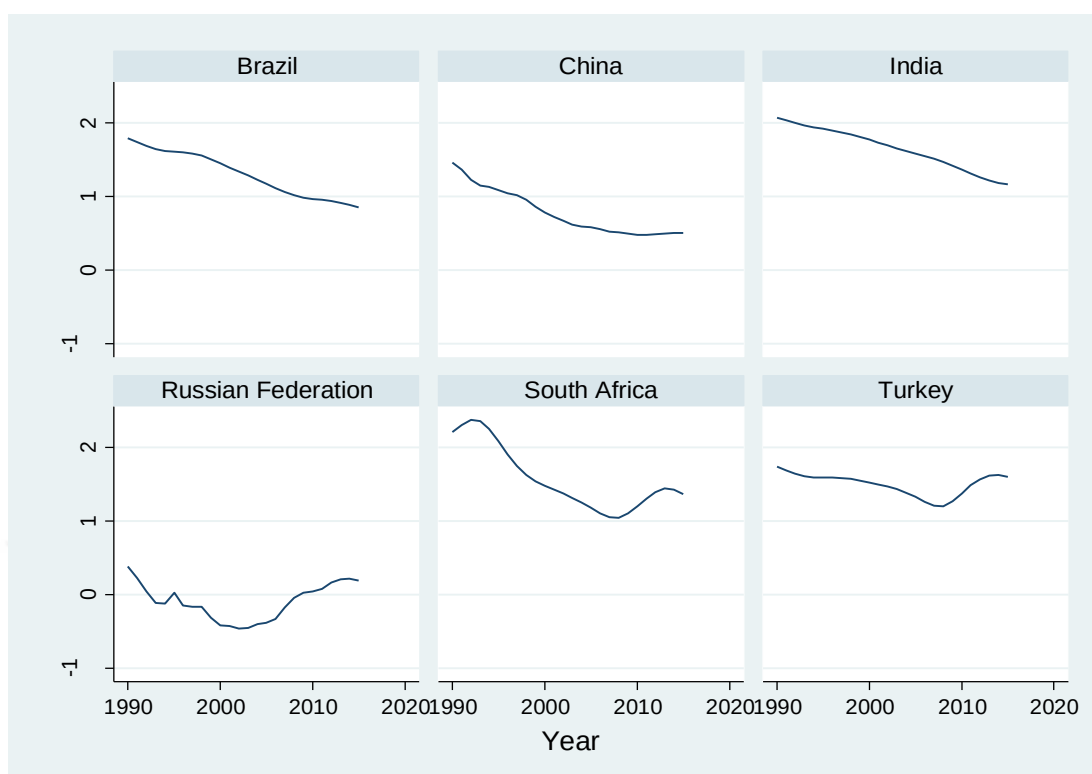


Figure A13: Population Growth Between 1990-2015

Source: World Bank's World Development Indicators database

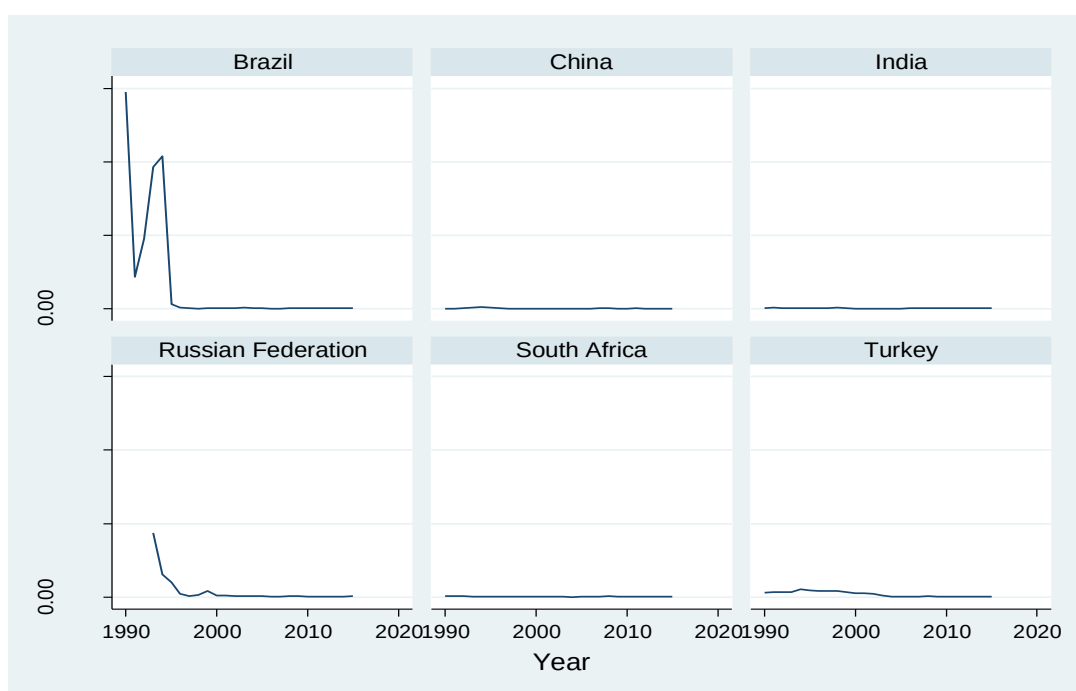


Figure A14: Consumer Price Index Between 1990-2015

Source: World Bank's World Development Indicators database

APPENDIX B

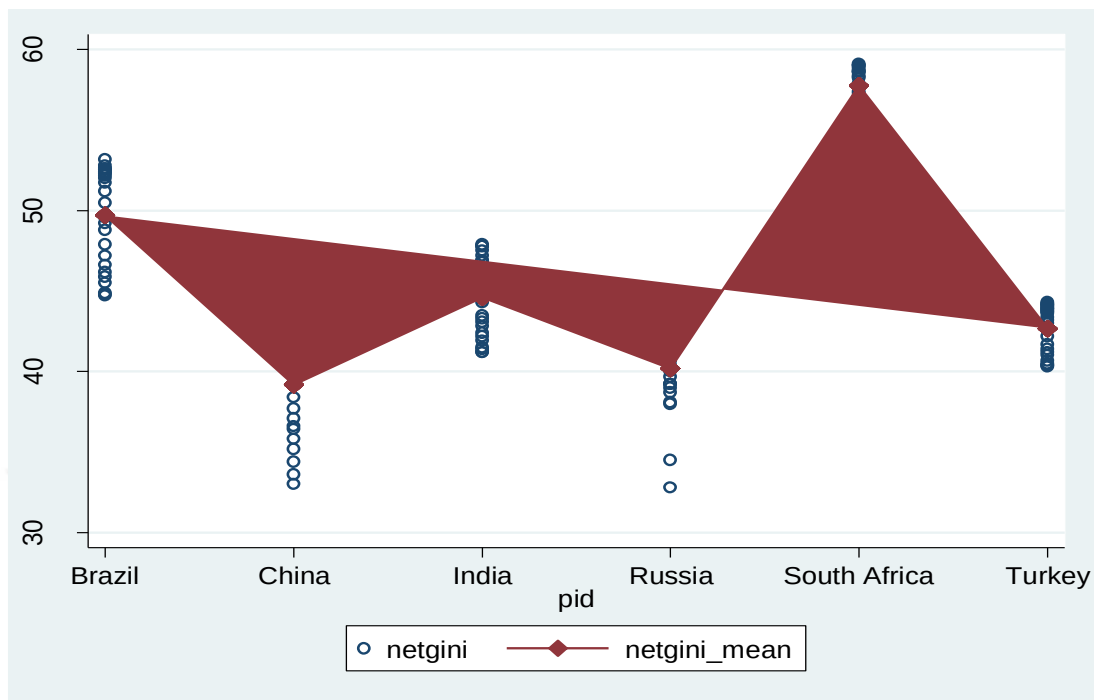


Figure B1: Heterogeneity Across Countries

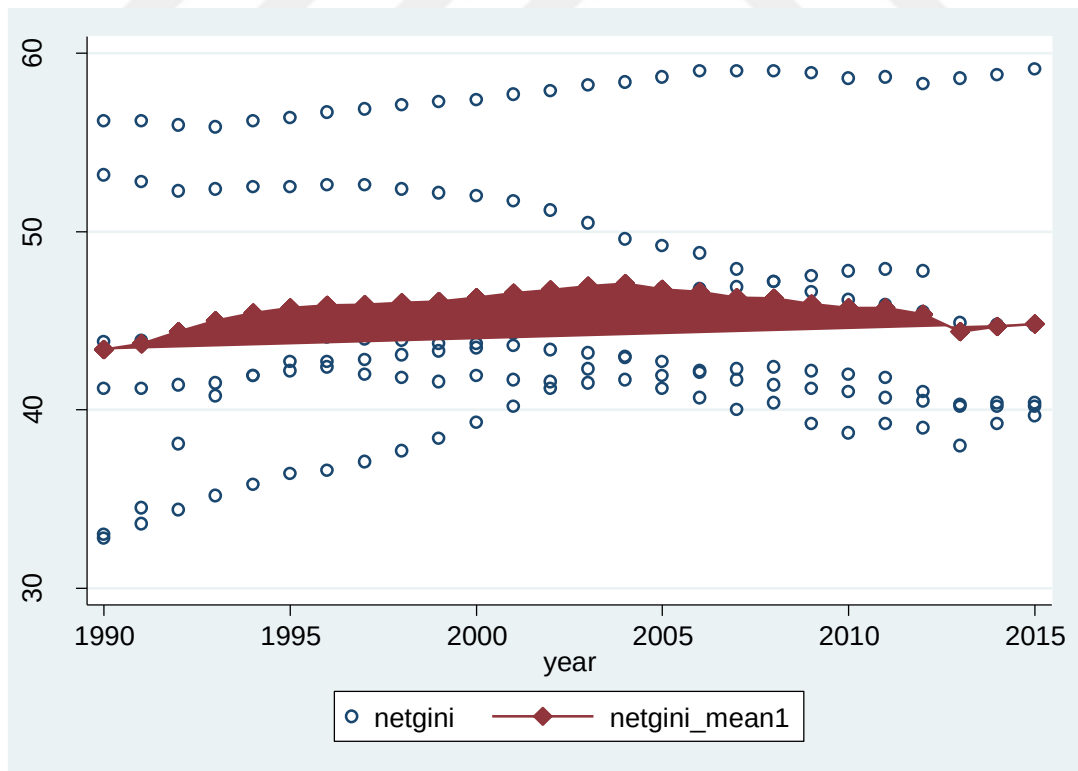


Figure B2: Heterogeneity Across Years

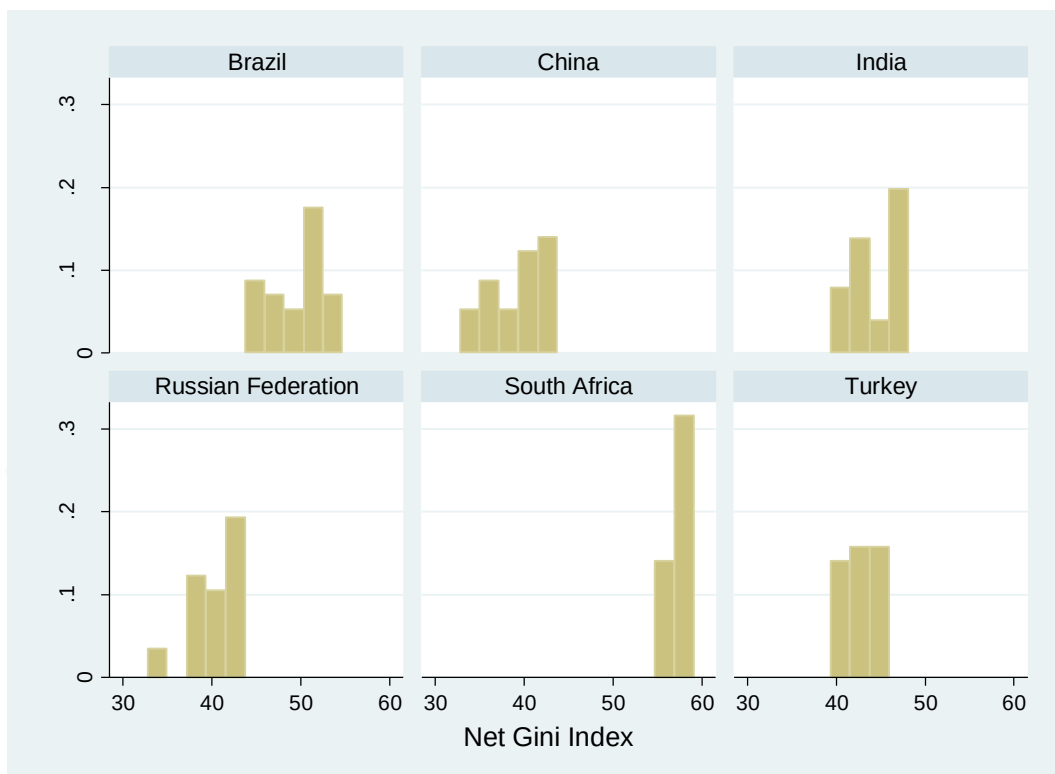


Figure B3: Histogram of Gini Indexes

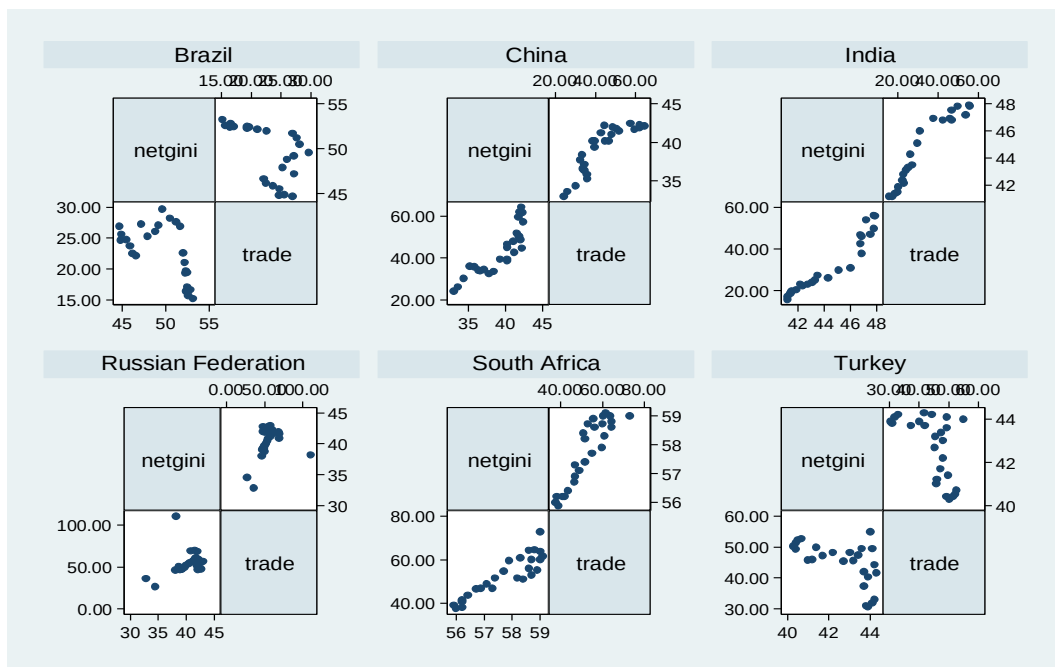


Figure B4: Scatterplot Matrix of Net Gini Index versus Total Trade(% of GDP)

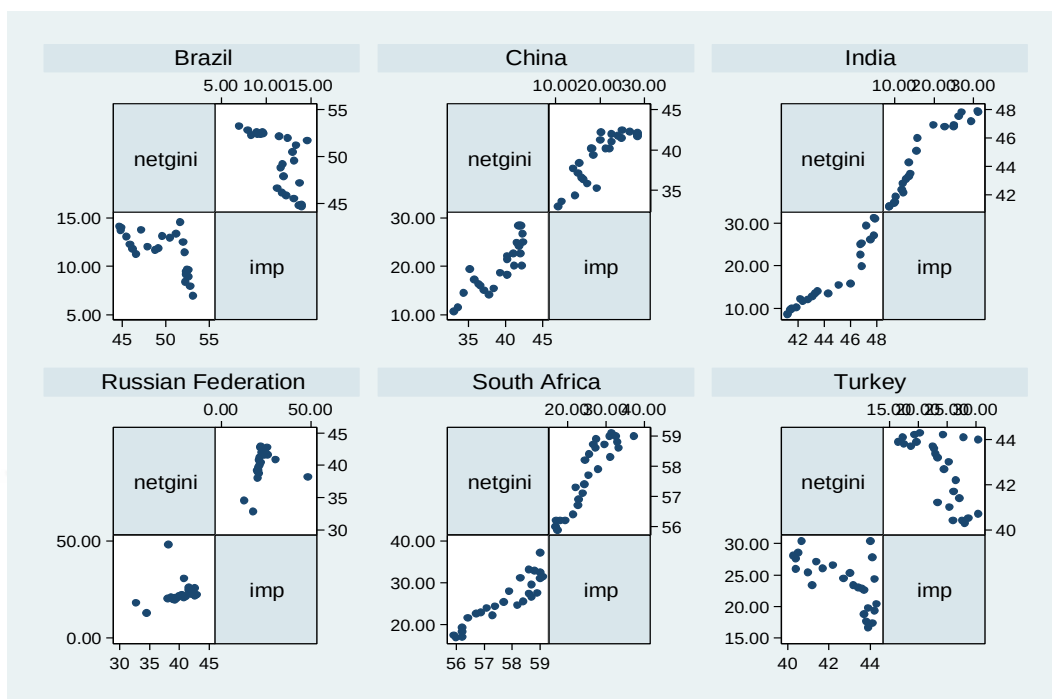


Figure B5: Scatterplot Matrix of Net Gini Index vs Imports(% of GDP)

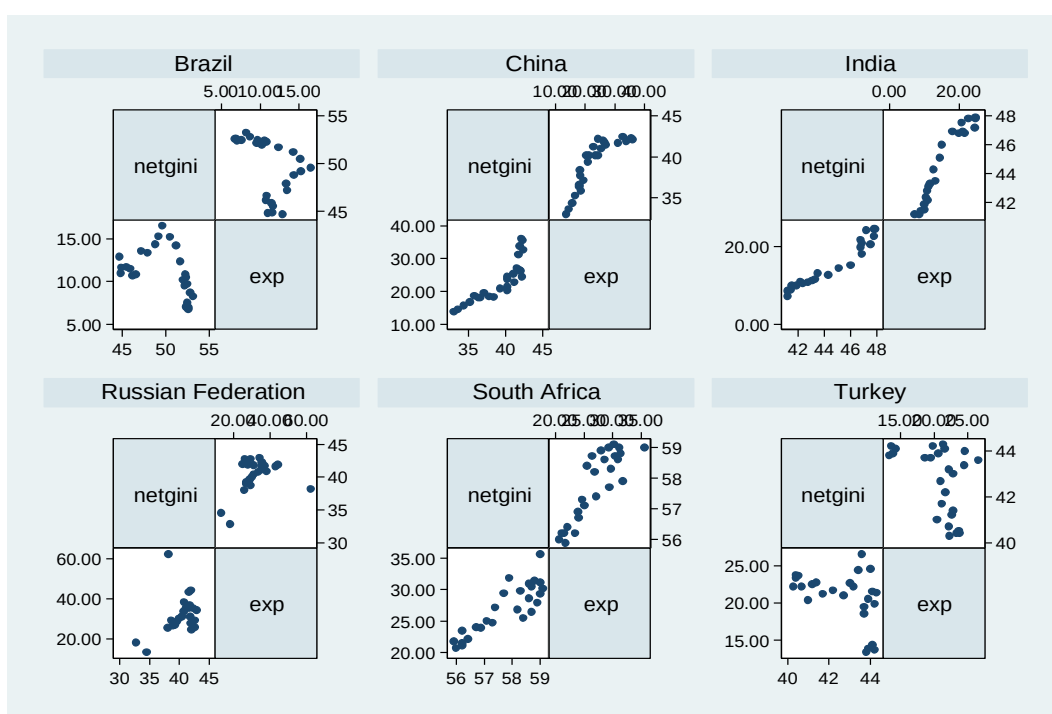


Figure B6: Scatterplot Matrix of Net Gini Index vs Exports(% of GDP)

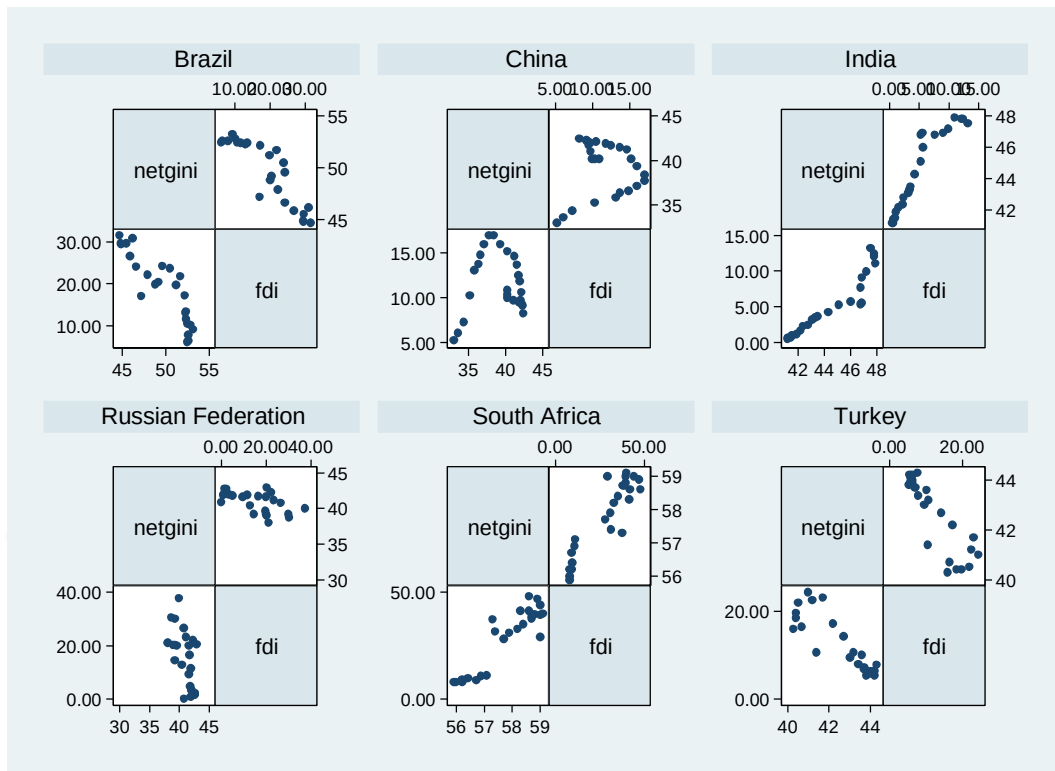


Figure B7: Scatterplot Matrix of Net Gini Index vs FDI(% of GDP)

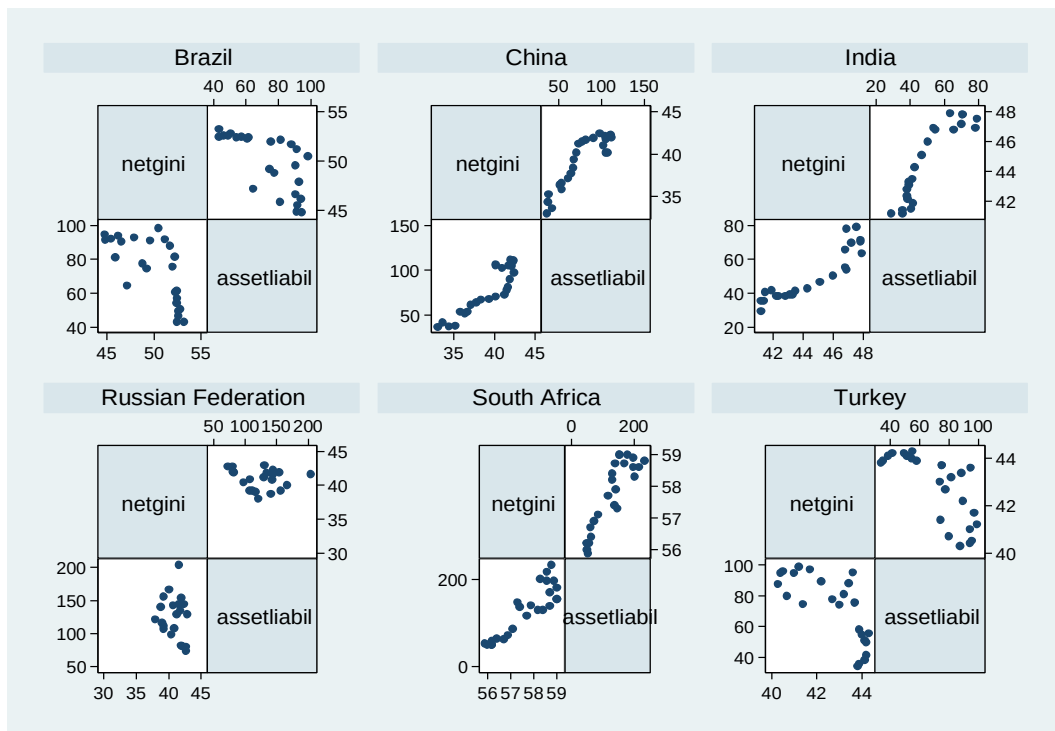


Figure B8: Scatterplot Matrix of Net Gini Index vs Total Assets and Liabilities(% of GDP)

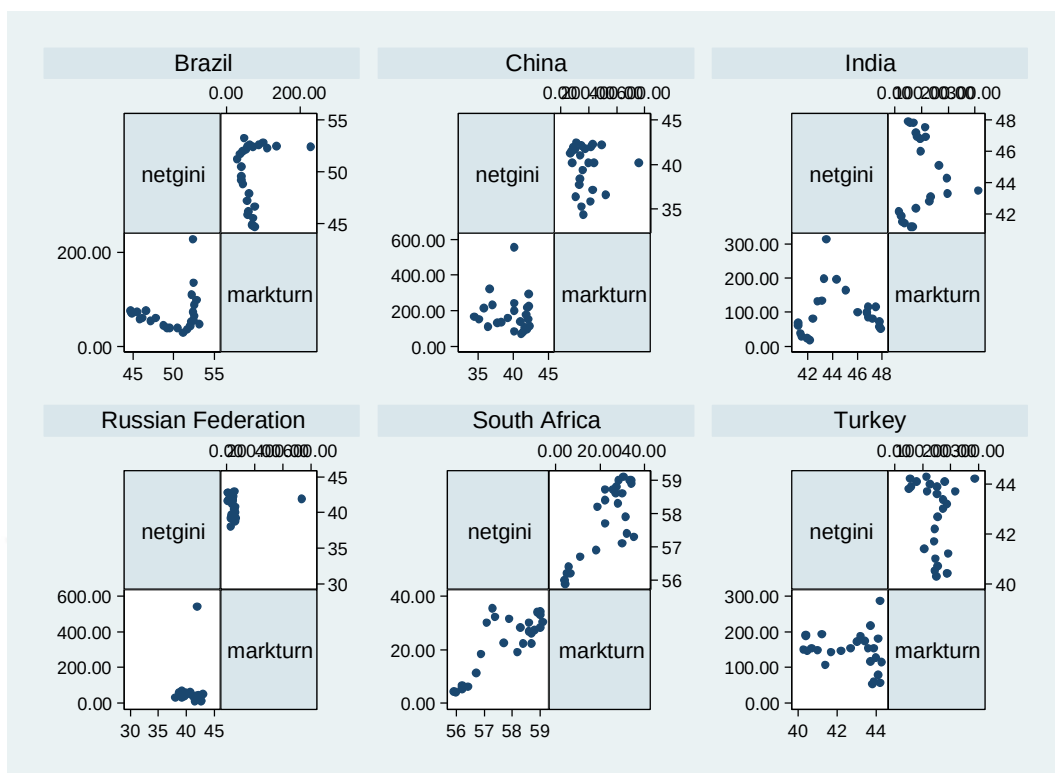


Figure B9: Scatterplot Matrix of Net Gini Index vs Stock Market Turnover Rate(%)

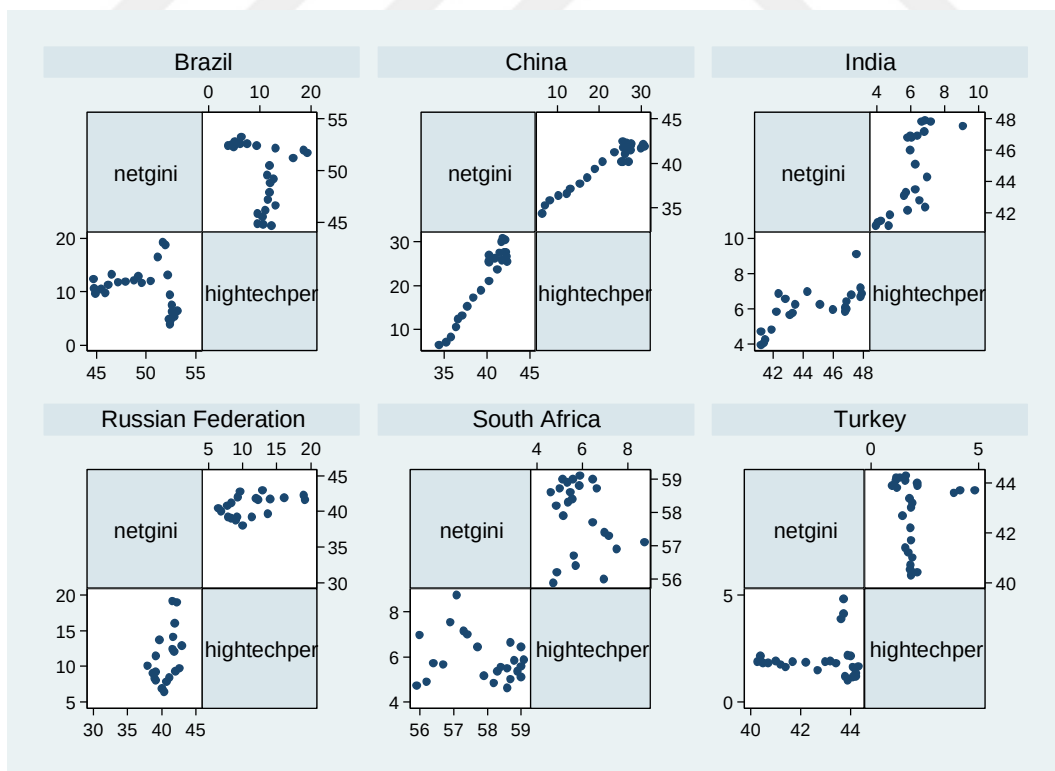


Figure B10: Scatterplot Matrix of Net Gini Index vs High Technology Export(% of manufactured exports)

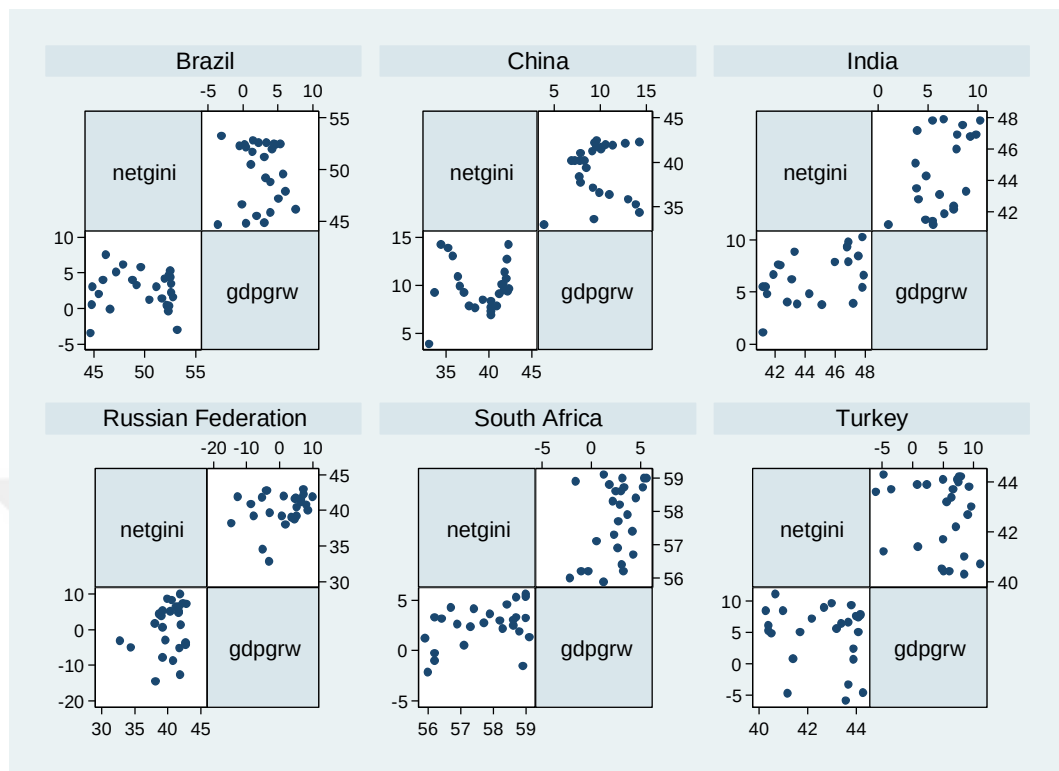


Figure B11: Scatterplot Matrix of Net Gini Index vs GDP Growth (%)

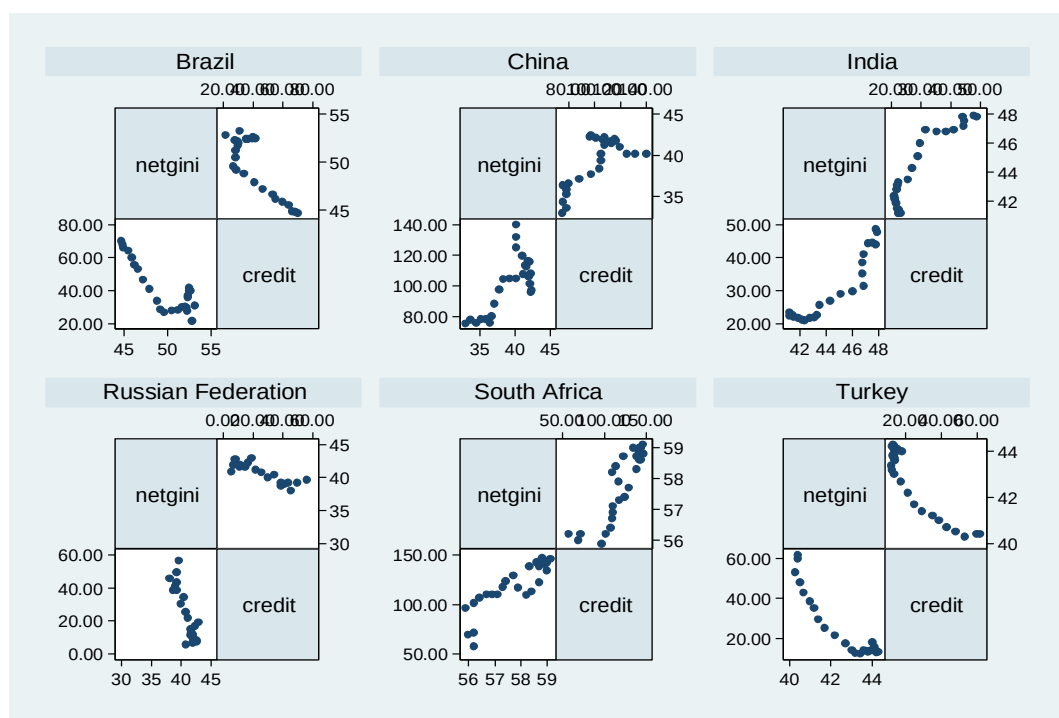


Figure B12: Scatterplot Matrix of Net Gini Index vs Private Credit (%)

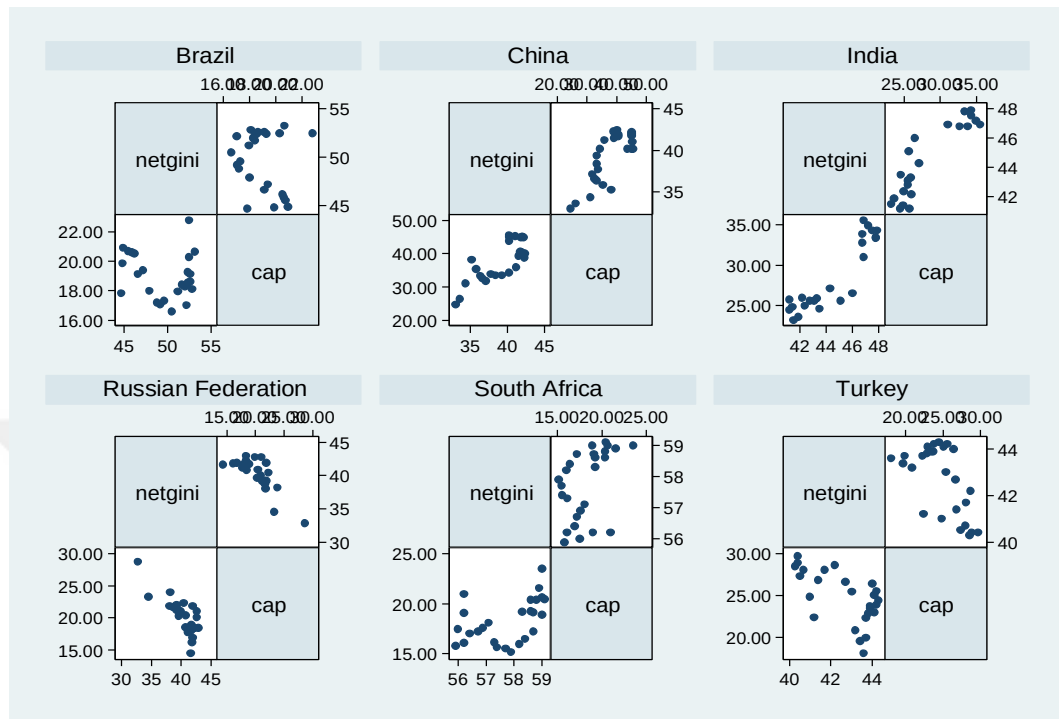


Figure B13: Scatterplot Matrix of Net Gini Index vs Gross Fixed Capital Formation(% of GDP)

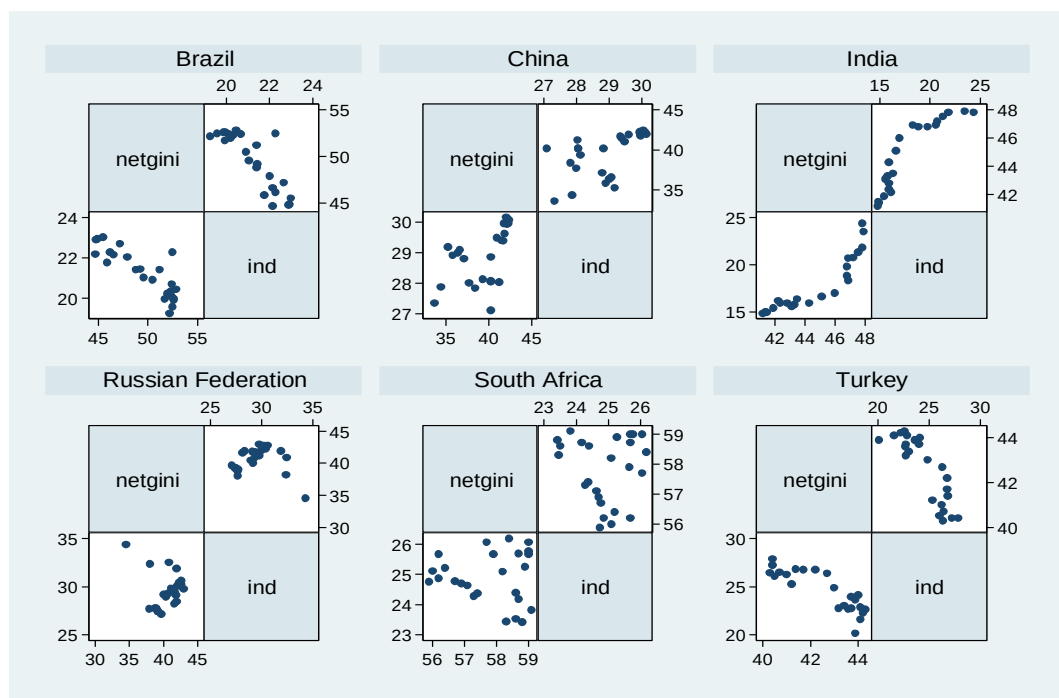


Figure B14: Scatterplot Matrix of Net Gini Index vs Industrial Employment(% of total employment)

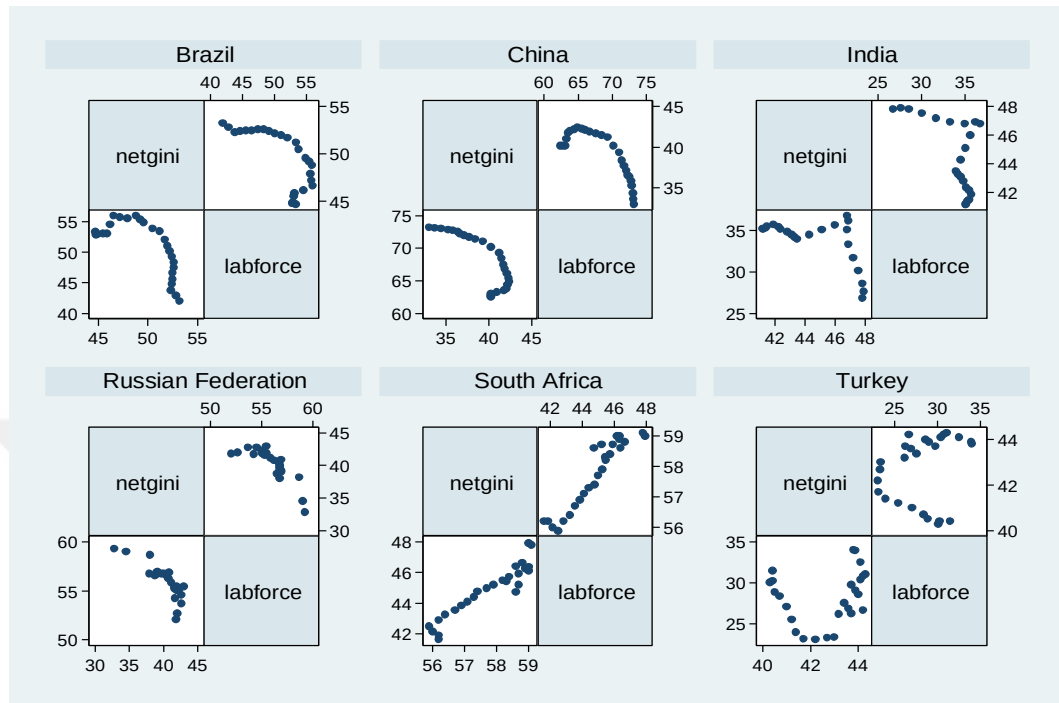


Figure B15: Scatterplot Matrix of Net Gini Index vs Labor Force Participation Rate of Females

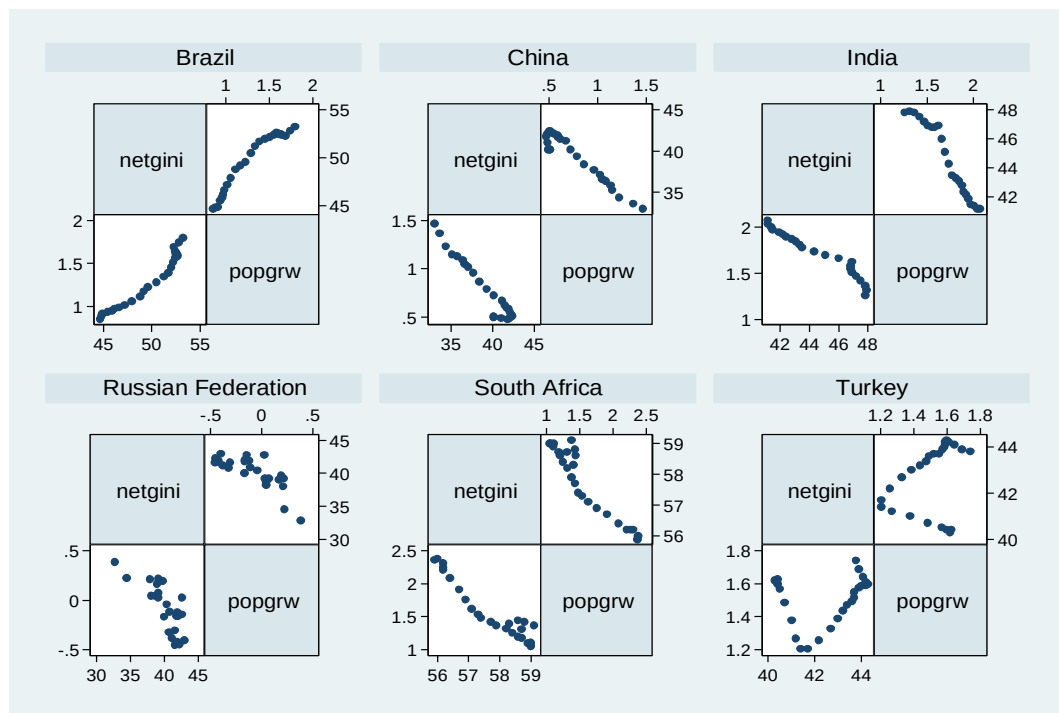


Figure B16: Scatterplot Matrix of Net Gini Index vs Population Growth (%)

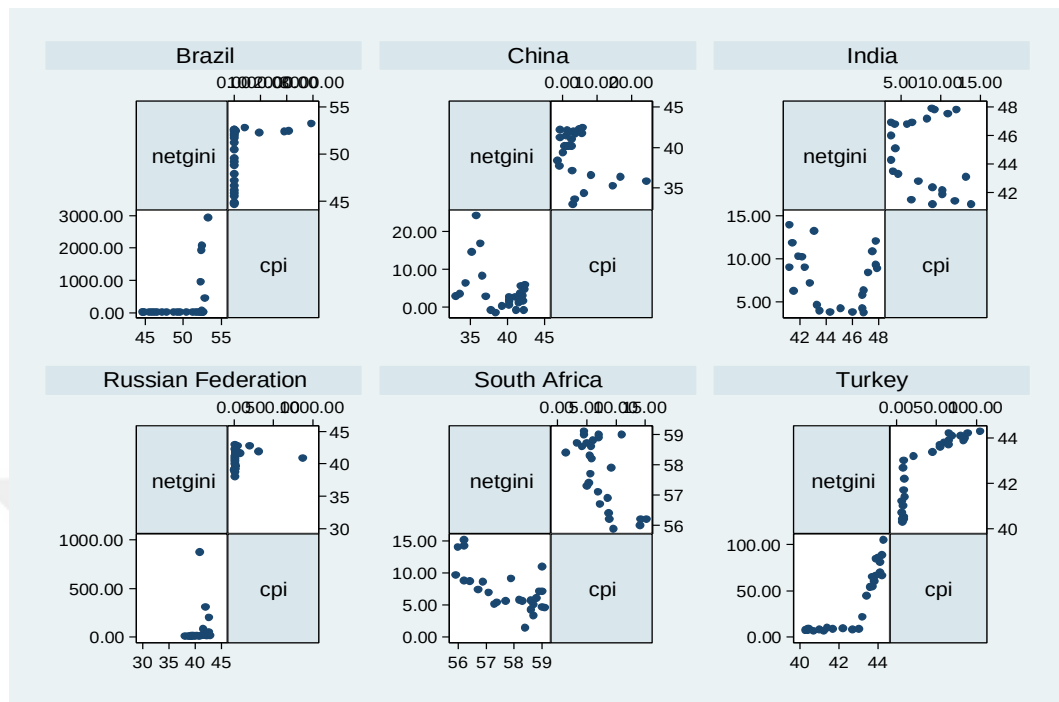


Figure B17: Scatterplot Matrix of Net Gini Index vs Consumer Price Index (%)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) netgini	1.000														
(2) trade	0.081	1.000													
(3) imp	0.155	0.939	1.000												
(4) exp	0.013	0.959	0.804	1.000											
(5) fdi	0.453	0.368	0.351	0.348	1.000										
(6) markturn	-0.488	-0.120	-0.050	-0.167	-0.342	1.000									
(7) assetliabil	0.327	0.696	0.582	0.726	0.790	-0.336	1.000								
(8) kaopen	-0.260	0.044	-0.003	0.079	0.220	-0.198	0.122	1.000							
(9) gdpgrw	-0.380	0.134	0.141	0.116	-0.181	0.391	-0.162	-0.203	1.000						
(10) credit	0.437	0.378	0.391	0.334	0.515	-0.099	0.448	-0.227	0.136	1.000					
(11) cap	-0.510	0.124	0.190	0.059	-0.334	0.569	-0.240	-0.229	0.618	0.253	1.000				
(12) ind	-0.268	0.661	0.515	0.721	0.279	0.058	0.458	0.186	0.224	0.373	0.263	1.000			
(13) labforce	-0.219	0.041	-0.168	0.208	0.189	-0.031	0.208	0.050	0.268	0.441	0.262	0.548	1.000		
(14) cpi	0.142	-0.250	-0.260	-0.218	-0.081	0.155	-0.127	-0.241	-0.067	-0.119	-0.101	-0.120	-0.049	1.000	
(15) popgrw	0.413	-0.478	-0.242	-0.628	-0.238	0.091	-0.517	-0.337	-0.125	0.001	-0.105	-0.718	-0.582	0.129	1.000
(16) hightech	-0.255	0.166	0.008	0.281	-0.040	0.117	0.145	-0.051	0.339	0.368	0.544	0.464	0.747	-0.131	-0.535

Figure B18: Correlation Matrix

APPENDIX C

Unit Root Test Results

All Variables except High Technology Export

Based on Augmented Dickey-Fuller tests

Ho: All panels contain unit roots	Number of panels = 6
Ha: At least one panel is stationary	
AR parameter: Panel-specific	Asymptotics: $T \rightarrow \text{Infinity}$
Panel means : Included	
Time trend: Not included	
Drift term: Included	ADF regressions: 1 lag

All Variables	p-value			
	Inverse chi-squared(12) P	Inverse normal Z	Inverse logit t(34) L*	Modified inv. chi-squared Pm
netgini	0.0004	0.0004	0.0003	0.0000
trade	0.0000	0.0000	0.0000	0.0000
import	0.0000	0.0000	0.0000	0.0000
export	0.0000	0.0000	0.0000	0.0000
fdi	0.0046	0.0020	0.0027	0.0004
assetsliabilities	0.0085	0.0030	0.0047	0.0013
markettturnover	0.0000	0.0000	0.0000	0.0000
kaopen	0.0000	0.0000	0.0000	0.0000
gdpgrowth	0.0000	0.0000	0.0000	0.0000
privatecredit	0.0456	0.2023	0.1214	0.0283
capitalformation	0.0001	0.0000	0.0000	0.0000
industryemployment	0.0122	0.0033	0.0062	0.0028
labforceparticipat	0.0002	0.0000	0.0001	0.0000
popgrowth	0.0000	0.0000	0.0000	0.0000
cpi	0.0000	0.0000	0.0000	0.0000

P statistic requires number of panels to be finite.

Other statistics are suitable for finite or infinite number of panels.

High Technology Export

Levin-Lin-Chu unit-root test

Ho: Panels contain unit roots

Number of panels = 6

Ha: Panels are stationary

Number of periods = 26

AR parameter: Common

Asymptotics: N/T $\rightarrow$ 0

Panel means: Included

Time trend: Not included

ADF regressions: 1 lag

LR variance: Bartlett kernel, 9.00 lags average (chosen by LLC)

	Statistic	p-value
Unadjusted t	-4.6653	
Adjusted t*	-2.5716	0.0051

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