Export diversification, specialisation and inequality: Evidence from Asian and Western countries

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ABSTRACT
This paper examines the dynamic effect of globalization at the disaggregated level of sectoral export diversification and manufacturing specialization on income inequality using a panel data set of 52 Asian and Western countries from 1988 to 2014. The paper uses dynamic panel data models applying the System Generalized Method of Moments (GMM) estimations that provide more accurate and better results than those obtained with static panel data models. The results suggest that there is no statistically significant relationship between manufacturing specialization and inequality while sectoral export diversification has been the driving force of inequality. For sub-groups of countries, higher sectoral export diversification increases inequality and higher manufacturing specialization decreases inequality in high-income Asian countries and European Union (EU) member states. Moreover, the study finds insignificant effects in low-income Asian countries and Anglo-Saxon countries.

KEYWORDS Export diversification; specialization; income inequality; dynamic panel data model

JEL CLASSIFICATIONS C23, D30, D63, F02, F10, F15

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1. Introduction
The effect of globalization on income inequality is one of today’s most crucial issues (see, for example, Stiglitz 2012; Deaton 2013; Piketty 2016) and therefore the legitimacy of globalization is in question. Based on the existing literature, the study focuses principally on traditional macro-economic variables of globalization at the very first level of aggregation, including trade openness, financial openness, international migration, technological globalization, etc. (Subir et al. 2007; Roberto and Andrés 2013; Dimitrios, Sophia, and Argiro 2014). The distributional effect of globalization at a more disaggregated level has been less thoroughly explored. Recent empirical papers establish the impact of different dimensions of trade on poverty and inequality (Mahadevan, Nugroho, and Amir 2017; Pavcnik 2017; Santos-Paulino 2017). For instance, Nguyen Viet (2015) shows that trade facilitation (number of documents, time for exports and imports) is strongly correlated with poverty and inequality. Countries with more improvement in trade facilitation...
are more likely to have lower poverty and inequality. According to Franco and Gerussi (2013) on a sample of 17 Transition Countries over the period 1990–2006, trade may affect income distribution and when trade occurs with developed countries, it seems to influence inequality by the channel of educational system.

In the modern era of globalization, besides a variety of factors, from an economy’s factor endowments, geography, institutions, and social capital, to its historical trajectories, changes in technology, and returns to capital in explaining inequality Dominik et al. (2017), sectoral level export diversification becomes an interest of investigation because the impact of trade openness as a whole cannot be verified empirically in many aspects. The standard trade theory suggested as an economy concentrated in low-skilled labour (high-skilled labour and capital) intensive products, the countries would experience lower (higher) income inequality. However, the post-colonial economies specializing in agricultural products and the advanced European economies specializing in sophisticated products have experienced higher inequality and more equal society respectively (Innis 1970; Haber 1997; Acemoglu and Robinson 2012; Hidalgo 2015; Dominik et al. 2017). Interestingly, in the economy advancing in high innovative and technological products and services like that of the United States of America, the high level of inequality has become a serious matter of discussion (Stiglitz 2012; Deaton 2013; Lee 2013; Krugman 2014; Piketty and Goldhammer 2014).

Considering Asian countries have been playing a greater role in world production in the manufactured goods, technology and service sectors (Krugman, Obstfeld, and Melitz 2012, 21) and high potential effects of international trade, the aim of the paper is to analyse the impact of exports diversification and national specialization on income inequality in a large sample of Asian and Western countries. It uses a panel data set of 52 Asian and Western countries from 1988 to 2014 and applies the Arellano and Bond (1991) and Arellano and Bover (1995)/Blundell and Bond (1998) System Generalized Method of Moments (GMM) estimators.

This paper distinguishes itself from the existing literature from several points of view. First, it focuses on the effect of sectoral export diversification and manufacturing specialization on income inequality and not only on traditional macro-economic variables of globalization, which have been extensively covered in the literature as indicated above. Secondly, it concentrates both on Asian countries – the world’s greatest emerging economies –, and Western countries – the world’s greatest economies (Kishore 2014, 123–126), on which the empirical evidence in this context have been less explored. It is important to focus on this matter because these two giant regions are of course the most powerful global centres of population, economics, politics and international affairs. In terms of size, there are only 52 Asian and Western countries in the sample, but they represent 64.56% of the global population, 77.32% of global GDP, 71.32% of global exports and 74.74% of global imports. Estimating an overall average, these countries represent 72.15% of global share (please see more detail in Appendix A4 and A5). The other interesting fact is that, in the 21st century, the centre of gravity of the world economy has shifted decisively from the Atlantic to the Pacific Ocean, which is today the arena of the greatest trade network in the world (Quah 2011; Kishore 2013; Lee 2013). Therefore, everything that happens in these two regions will attract very strong public attention. Thirdly, this study tries to identify separate effects to account for heterogeneity between countries and, lastly, to measure the influence of each factor on variations in income inequality among countries and over time. To be more precise, we estimated the effects on four groups of countries, including high-income Asian countries, low-income Asian
countries, EU member states and Anglo-Saxon countries. In overall terms, the last two groups show less heterogeneity than their Asian counterparts.

The empirical findings emphasize the fact that trade openness, foreign direct investment (FDI), manufacturing specialization, and high-technology exports have no statistically significant impact on income inequality. Moreover, sectoral export diversification has been the driving force behind inequality. At the level of sub-groups of countries, trade openness decreases inequality in EU member states but increases it in low-income Asian countries. Higher sectoral export diversification increases inequality while higher manufacturing specialization decreases inequality in high-income Asian countries and EU member states. Moreover, the study finds that the impact of high-technology exports on inequality is insignificant for all sub-groups of countries. In this perspective, policy implications concern the implementation of industrial policy in order to develop basic manufactured specializations (unskilled labour).

The paper is structured as follows. After the introduction, Section 2 presents a brief survey of the theoretical and empirical literature on the link between globalization and income inequality. Section 3 explains data sources and preliminary evidence from descriptive and inferential statistics. Section 4 introduces the econometric methodology and discusses the limits of empirical analysis. Section 5 gives details of empirical results and discussions. The final section provides the main conclusion as well as discussing policy implications and suggesting some new lines for further research.

2. Review of related literature

The fundamental economic theory, explaining the effect of globalization on income inequality through trade openness, can be found in the neoclassical trade theory proposed by Heckscher (1919), Ohlin (1933) and Samuelson (1953), known as North-South HOS theory with the hypothesis of two countries, two goods and two factors of production. The theory argues that trade openness would result in an increase in the wages of low-skilled workers in developing countries, where low-skilled jobs are abundant, and a decrease in the wages of high-skilled workers in advanced countries, where high-skilled jobs are abundant. According to Stolper and Samuelson (1941), in developing countries, in which low-skill factors are relatively abundant, this would cause a reduction in income inequality and whereas in advanced countries, characterized by high-skill factors, it would lead to rising income inequality.

From a survey of theoretical literature related to the effect of globalization at the highest level of aggregation on inequality, there is still an unresolved debate among three schools of thought, which is informative but inconclusive. Moreover, the empirical results change, depending on the period studied and the context of each country’s economic development.

The first school of thought suggests a positive distributional effect of globalization, which generates higher incomes in both advanced and developing countries, at least in absolute terms. This promising view is in accord with Kuznets’ hypothesis (Kuznets 1955), which explains that inequality might increase in initial phases of industrial development, but will decline in the long term, once the process of industrialization is advanced. Therefore, in modern era of globalization, even less-developed economies will become better off with more equal society in the long run (Barro 2000; Ravallion 2001; Subir et al. 2007; Pavcnik 2017).
The second school of thought explains, on the contrary, a negative distributional effect of globalization on inequality. The principal idea argues that the benefits of globalization are not distributed equally among the people within a country even though globalization might increase overall income. According to Lundberg and Squire (2003), there are clear losers and winners, not only in relative terms but probably even in absolute terms. Moreover, widening income inequality within a country and the fact that the benefits of globalization fail to reach the poorest will raise social, economic and political challenges and, at the same time, will result in many economic growth problems, since the potential benefits cannot be maximized (see Subir et al. 2007).

The last school of thought emphasizes a neutral distributional effect of globalization on inequality. We could find either statistically insignificant relationship or a negative relationship between globalization and income inequality (Dollar and Kraay 2002; Mahler 2004; Milanovic 2005; Subir et al. 2007; Babones and Vonada 2009). This particular issue has been the subject of empirical evidence of an increase in the skill premium between skilled and unskilled workers in many developing countries (Goldberg and Pavcnik 2007).

However, considering the stylized facts on globalization and inequality over the last decades, the traditional theories are unable to provide the explanation of the effects, where we found rising inequality in developing countries and lower or stable inequality trends in advanced countries, especially in European countries. New extensions to the theories have emerged in order to explain this paradox. According to literature, there are at least four major approaches contributing to the analysis. The first model has been developed to extend the traditional North-South HOS model by fundamentally correcting the restricted assumptions (Agell and Lundborg 1995; Davis 1998; Albert and Meckl 2001; Kreickemeier and Nelson 2006; Chusseau and Hellier 2012). The second model tries to explain the effect of globalization on inequality by assessing technological and institutional changes (Krugman and Lawrence 1993; Krugman 1994). The third model analyses the effect of FDI, multinational enterprises (MNEs) and international outsourcing in explaining inequality in both advanced and developing countries (Chusseau and Hellier 2012). The fourth model has been developed to explain the effect of openness when firms are heterogeneous. This model is called heterogeneous firms and New New Trade Theory (Melitz and Redding 2015).

In addition to this background, it is worth examining in detail the distributional effects of globalization through sectoral export diversification / specialization at the disaggregated level and how control factors contribute to income inequality.

### 2.1. Key determinants through which sectoral export diversification / specialization affects income inequality

The relationship between economic development and income inequality was investigated by Kuznets in 1955, which emerged as the famous theory of the ‘Kuznets’ curve’. The theory suggested that as a country’s economy develops, market mechanisms would increase income inequality at the right stage then decrease at the later stage. Decades later, Imbs and Wacziarg (2003) proposed a U-shaped pattern studying the evolution of sectoral concentration in relation to the level of per capita income. The authors found that countries first diversify, in the sense that economic activity is spread more equally across sectors, but there exists, relatively late in the development process, a point at which they start specializing again. Putting together the ideas of Kuznets’ curve and Imbs &
Wacziarg's curve, we might presume that, at the early stage of economic development, a country whose economy has experienced higher export diversification would generate rising income inequality; then, higher sectoral export concentration would result in lower income inequality in the long term. Although Kuznets' curve has been failed to confirm empirically in some cases of countries, there is a strong possibility that sectoral export diversification / specialization is among the determinants of income inequality besides a variety of factors.

For instance, many papers such as those of Innis (1970), Haber (1997), Acemoglu and Robinson (2012), and Dominik et al. (2017) have shown that the post-colonial economies like Brazil and Mexico that concentrated its sectoral export in a small amount of agricultural or mineral products, including sugar, gold, and also coffee, are likely to have higher inequality of income, wealth, human capital as well as political power. Hidalgo (2015) and Dominik et al. (2017), otherwise, showed that the economies specializing in sophisticated products, such as medical imaging devices or electronic components might become more equal in term of income, wealth and the inclusiveness of that economy’s institutions.

Beside trade openness, financial liberalization through FDI also plays a significant role in explaining inequality. Cornia (2011) shows that foreign investment in labour-intensive manufacturing sectors (such as textile, shoes, apparel, food processing, furniture, toys, beverages, simple assembly operations, motor vehicle construction, etc.), and services (such as trade, restaurants, hotels, and so on) leads to reduce income inequality in low-wage and labour-abundant countries by accelerating capital accumulation, raising demand, and offering higher wages for low-skilled jobs. On the other hand, foreign investment in skilled-labour services (such as utilities, finance, telecommunications, transport, business services, etc.) and capital-intensive industries (such as chemicals, metallurgy, machinery, etc.) is expected to increase the wages of skilled workers to high levels, consequently increasing income inequality (see Avarmaa, Hazak, and Männasoo 2013).

Additionally, in modern era of the fourth industrial revolution, we also observed the rise of the advanced economies like the United States of America, which specialize in high innovative and talent products and services. In American society today, people are not interested in hanging on to old-type jobs which can be done by China, India and Eastern Europe. They saw their future in a world where wealth was generated not by making widgets or cars, but by brain power, imagination, artistry, knowledge, and intellectual property (Lee 2013). However, at the same time, we also found a great inequality within today’s American society where the rise of the Top incomes has been particularly striking. This fact is well documented by many notable thinkers like Stiglitz (2012), Deaton (2013), Piketty and Goldhammer (2014) and Krugman (2013, 2014).

Prior to the earlier findings, the most recent thesis of Dominik et al. (2017) studied the connection between economic complexity and income inequality over 150 countries during 1963–2008. The authors uses many prominent index such as the Economic Complexity Index (Hidalgo and Hausmann 2009) and the Herfindahl–Hirschman Index (Hirschman 1945; Herfindahl 1950) to measure a variety of measures of productive structures. By computing multivariate regression analysis, the authors suggested that, over time, countries that experience increases in economic complexity are more likely to experience decreases in their level of income inequality.

To summarize, traditional theories of globalization provide too straightforward an explanation while the new extensions present additional challenges for empirical
investigation. For the survey of empirical studies, we found mostly analysis and discussion of macro-economic variables at a very high level of aggregation through trade openness, financial openness, etc. despite the fact that the disaggregated levels of trade and FDI in both advanced and developing countries contain not only low and high quality but also medium quality. These variables, along with other control vectors, such as technological progress, technological transfers and political and economic changes should have been estimated empirically.

### 2.2. Selected control variables

The choice of control variables is based on significant factors, previously discussed in the existing literature, which are commonly used to explain inequality. Based on the availability of data, we decided to include the following control variables: technological development, GDP per capita, population growth and public expenditure. There are certainly other variables that might have an impact on income inequality but in this paper, we have limited ourselves to the above-mentioned variables.

**Role of technology, measured by high-technology exports (as a percentage of manufactured exports):** One of the influential factors on income inequality is the role of technology in explaining trade development. According to Birdsall (2005), technological changes favour those with higher skills and exacerbates the ‘skills gap’. This could adversely affect the distribution of income in both developing and advanced economies by reducing the demand for lower-skill activities and increasing the premium of higher-skill activities. If this is empirically true, it will result in higher income inequality. However, the positive effect of education could transform low-skilled workers into high-skilled workers in the long term, thus resulting in lower income inequality.

**Role of income, measured by GDP per capita, PPP (current international $US):** The general effect of GDP per capita on income inequality is explained by the well-known inverted ‘U’ hypothesis developed by Kuznets (1955). Based on the explanation in the previous section, an increase in GDP per capita will increase overall economic welfare and income disparity. Following the process of economic development, inequality will increase during the first stage and after it arrives at the peak, inequality will decrease. However, according to Piketty and Goldhammer (2014, 15), the magical Kuznets curve theory was formulated in large part for the wrong reasons, and its empirical underpinnings were extremely fragile. The sharp reduction in income inequality that we observe in almost all the rich countries between 1914 and 1945 was due above all to the world wars and the violent economic and political shocks they entailed (especially for people with large fortunes). It had little to do with the tranquil process of intersectoral mobility described by Kuznets. The authors, moreover, argued that the inequality may continue to increase even later stage of economic development.

**Role of population growth, measured by the annual percentage growth in population:** Income inequality can shift because of changes affecting labour supply and labour demand (Dimitrios, Sophia, and Argiro 2014). In addition, changes in population affect changes in labour supply and demand, which affect wages on the labour market. An increase in population is expected to increase income inequality if the unemployment rate increases.

**Role of government size, measured by public spending (as a percentage of GDP):** In any government, public spending is considered as a major economic tool in dealing with
redistribution policies. Public spending is cash payment for the operating activities of the government in providing goods and services. It includes employees’ wages and salaries, interest and subsidies, grants, social benefits, and other expenses such as rent and dividends, public investment in infrastructure, health and education, environmental protection, etc. (World Bank 2017). In general, the aim of public spending is to improve the overall economic well-being of a whole population, especially the poor. According to Selowsky (1979) and Younger (1999), the effect on income distribution depends on how the government targets specific population groups through social protection, education, health, etc.

3. Data and preliminary evidence

The data sources used in this paper were collected primarily from the World Bank Development Indicators (WDI), the Organization for Economic Cooperation and Development (OECD) National Accounts data, the International Monetary Fund (IMF), the International Financial Statistics and Balance of Payments databases (IFSBPD), the International Debt Statistics (IDS), the UN – National Bureau of Economic Research (NBER) dataset, the COMTRADE bilateral trade flow data, the World Integrated Trade Solution database (WITS), the International Comparison Program database (ICPD), Government Finance Statistics Yearbooks, and other available sources. Appendix A1 indicates descriptively all the variables used in our analysis along with brief definitions and the data sources. Due to the lack of available data for some variables, especially for Asian countries, the estimation uses a dataset of only 52 countries (16 countries from the East Asia & Pacific region, 7 countries from South Asia, 2 countries from North America, and 27 countries from Europe) or 22 Asian countries and 30 Western countries between 1988 and 2014. Therefore, the total number of observations is 1,352 but low data coverage often significantly diminishes the number of observations when used in the regression.

For our sample, as shown in detail in Appendix A5, the Western countries are still the largest contributors to the world economy in absolute terms, however, Asian countries’ overall contribution is increasing relative to the west’s.

3.1. The structure of inequality and globalization over the last few decades

Without looking in depth at real databases, it might be thought that the advanced countries like the EU member states and Anglo-Saxon countries, known as the most liberal economies, would be characterized by much higher degrees of trade openness and FDI and especially by higher levels of sector-specific export specialization in manufacturing and high-technology sectors and, consequently higher levels of inequality as predicted by traditional international trade theories. However, the trends in the economic variables over the last few decades might cause surprise.

3.1.1. Inequality

In the estimation, we used the Gini coefficient to measure income inequality as the dependent variable. The Gini coefficient measures the degree to which the distribution of income expenditure among individuals or households in the economy differs from a perfectly equal distribution. It takes the value from 0, which represents perfect
equality, to 100 implying perfect inequality (World Bank 2016). All Gini coefficients are collected from the development research group of the World Bank, based on primary household survey data obtained from government statistical agencies and World Bank country departments.

In contrast to the predictions of traditional theories, the stylized facts show that the profile within and between Western and Asian countries are quite different. For OECD economies, the Anglo-Saxon countries experienced deeper and earlier increases in income inequality. The Scandinavian countries (Finland, Sweden and Denmark) have also undergone an increase in income inequality but at a very low rate. Moreover, continental European countries have not experienced any significant increase in inequality and, at the same time, in some countries like France, inequality is decreasing. For Asian economies, on the other hand, inequality is very different, based on the degree of economic development of each country such as the Asian dragons, the four Asian tigers (Thailand, Malaysia, Indonesia and the Philippines), the other ASEAN countries, China, India, etc.). Yet, in general, these countries have experienced higher inequality than the OECD countries.

In the database we used for this estimation, the lowest value of the Gini coefficient is 19.4 while the highest value is 63.26, with an average value of around 35.7 from 1988–2014 (please see Appendix A6 for details). The Gini coefficient does indeed differ considerably between sub-groups of countries. For high-income Asian countries, the lowest value is 24.5 and the highest is 49.15 with the average value around 39.99. Based on the results shown in Appendix A7, we also observed high disparity in inequality between countries. In the same way, the lowest value of the Gini coefficient of the low-income Asian countries is around 27, and the highest value is 63.26, with an average value of 36.5. The Gini coefficient of EU member states and Anglo-Saxon countries ranges from 19.4 to 39.5 and from 31.15 to 41.75 respectively. Among these sub-groups of countries, EU member states score the lowest level of minimum, maximum and average Gini coefficient.

The results shown in Appendix A8 indicate the trends over the last few decades. In general, inequality tended to increase slightly between 1988 and 2014 in all groups of countries. On average, the high-income Asian countries have a greater degree of income inequality while the EU member states are the most equal societies. For low-income Asian countries and Anglo-Saxon countries, the Gini coefficient tends to be similar to the average value for all 52 countries. From this result, we might possibly suspect that EU member states, characterized by welfare states, happen to manage inequality better than Anglo-Saxon countries. High-income countries such as Japan, followed by the four Asian dragons, the four Asian tigers, then China, etc., which are in the process of actively opening up to the forces of globalization, have experienced higher levels of income inequality.

### 3.1.2. Globalization

In order to measure traditional macro-economic variables of globalization, we used trade openness (measured as the sum of exports and imports of goods and services as a percentage of GDP) and foreign direct investment (measured as a percentage of GDP).

Based on an empirical survey of many recent papers, since the beginning of the modern era of globalization the world economy has experienced the forces of globalization rapidly and in different ways. It is characterized by several types of progress, such as: (a)
an increase in the number of developing countries joining the global single market, (b) an increasing contribution from developing countries to world production and exports in manufacturing sectors, (c) the fact that developed countries no longer produce and export goods and services relying on unskilled labour, (d) high mobility of FDI and financial capital, and (e) a significant increase in MNEs and technological transfers to less developed countries.

As shown in Appendix A8, high-income Asian countries’ economies have been the most open to trade since 1988. On average, trade openness is more than 130% of GDP. Of course, the biggest free trade agreements are no longer with Western countries, but with other Asian countries. They include agreements between the ASEAN countries and a number of other nations, including China, Japan, South Korea, etc. The Trans-Pacific Partnership (TPP) trade initiative is expected to be the world’s largest trade agreement as it represents roughly 40% of global GDP and one-third of world trade (Kevin 2017). However, this trade deal was cancelled in the first week of the US president Donald Trump’s administration.

### 3.2. Focus on export diversification and manufacturing specialization

To analyse the effect of globalization on income inequality at a disaggregated level, we proposed two indicators: sectoral export diversification (measured by the export diversification index) and manufacturing specialization (measured by the Balassa revealed comparative advantage index of manufactured goods).

#### 3.2.1. Sectoral export diversification

Export diversification is measured by the Theil index, calculated by the IMF. The data cover 187 countries from 1962–2010. In our database, the data come from the UN–NBER dataset, which harmonizes COMTRADE bilateral trade flow data at the 4-digit Standard International Trade Classification (SITC) Rev. 1 level. Based on the results in Appendix A6, the lowest value is 1.14 while the highest value is 5.37, and the average value is 2.51 for the period from 1988 to 2010.

The export diversification index differs for the different sub-groups of countries. We observed that the higher the level of economic development, the lower a country’s export diversification. In other words, richer countries tend to concentrate on producing exports. The pattern of the relationship between sectoral export specialization and GDP per capita can be described as a ‘U-shaped curve’ (Becuwe, Blancheton, and Meissner 2018). That is why we observed that advanced countries, both EU member states and Anglo-Saxon countries, have, on average, a lower export diversification index of 1.91 and 1.93 respectively. In the same way, lower-income Asian countries have, on average, higher export diversification indexes. Looking in greater depth, we also observed that the disparity between individual countries is far bigger among Asian countries than Western countries (please see Appendix A7 for details).

#### 3.2.2. Manufacturing specialization

We used the Balassa revealed comparative advantage index of manufactured goods, taken from WITS, to measure manufacturing specialization. It covers every country in the world from 1988 to 2014. The rationale for choosing this index is that it parallels
Dingel’s (2016) theoretical and empirical work on the determinants of quality specialization, which employs micro-data on US manufacturing sectors and factor inputs to quantify the roles of the two mechanisms in quality specialization in US cities.

The results of the estimation detailed in Appendix A6 show that the lowest value of the index is 0.03 while the highest value is 1.47, and its average value is 0.95 for the period 1988 to 2010. Looking at different country profiles, we observed that high-income Asian countries have the highest value of the specialization index, followed by EU member states whose index is greater than 1. However, we also found the lowest minimum value in high-income Asian countries. Notably, the Anglo-Saxon countries have the lowest index. Based on standard deviation (see Appendix A7), there is higher disparity in the datasets for Asian countries and Anglo-Saxon countries than in that for EU member states.

Since 1988, although there has been a very different profile for each sub-group of countries, the index has varied between 0.8 and 1.1 and it seems to have been moving towards a stable position since the 1990s. The value of the index has remained above the average for the 52 countries only in the high-income Asian countries and EU member states. In contrast, the Anglo-Saxon countries continue to have the lowest index among all the groups of countries.

3.2.3. Link between inequality and export diversification and specialization indexes
The results shown in Appendix A9 estimate the correlation between the Gini coefficient and all the explanatory variables of globalization. We found that the direction and the size of correlation change for each sub-group of countries. Sectoral export diversification is positively correlated with the Gini coefficient for the whole panel of 52 countries, for the high-income Asian countries and for EU member states; however, it is negatively associated in the case of low-income Asian countries and Anglo-Saxon countries. On the other hand, manufacturing specialization is positively linked to the Gini coefficient only in Anglo-Saxon countries, but negatively in high-income Asian countries and EU member states. However, there is no clear correlation for the whole panel of 52 countries or for low-income Asian countries.

With this alone, we could not reach any significant conclusion, but it may give us some ideas for further research. For a more critical analysis of this topic, in the next section we used the econometric methodology to study the real effects of sectoral export diversification and manufacturing specialization on income inequality.

4. Methodology

4.1. Specification function: globalization and income inequality
The theoretical basis explaining the effect of globalization on income inequality is unclear. Moreover, the effects at the disaggregated level of sectoral export diversification and manufacturing specialization should be studied empirically. Therefore, this paper conducts panel estimations of the effects on these variables. Ideally, the panel estimations should allow us to take into consideration both unobserved time-invariant and individual-invariant factors.

With a panel dataset of small time-series dimensions \(T = 26\) years and large cross-sectional dimensions \(N = 52\) countries, this paper applies the system GMM estimators to obtain efficiency and consistency. The econometric model is structured as follows.
Where, 
- $i$ and $t$ represent country and time respectively while $\alpha$ represents the intercept. 
- $\text{gini}_{it}$ refers to the Gini coefficient of country $i$ in year $t$. As the Gini coefficient is normally influenced by its value in the previous year, we used $\text{gini}_{it-1}$ as one of the explanatory variables. 
- $T\text{Glob}_{it}$ is a matrix of traditional macro-economic variables of globalization – trade openness (% of GDP), and FDI (% of GDP) of country $i$ in year $t$. 
- $D\text{Glob}_{it}$ is a matrix of the components of globalization variables at the disaggregated level – sectoral export diversification, measured by the export diversification index, and manufacturing specialization, measured by the Balassa revealed comparative advantage index of manufactured goods for country $i$ in year $t$. 
- $W_{it}$ is the set of control variables which are considered to have an impact on income inequality, such as high-technology exports (% of manufactured exports), GDP per capita (PPP, current international $US$), population growth (% annual), and public spending (% of GDP) of country $i$ in year $t$.
- The terms $\phi_T$, $u_i$, and $\varepsilon_{it}$ are respectively ‘time effects’, ‘country effects’ and ‘error term’. $\phi_T$ is parameter coefficient of the time dummy effect, taking a binary variable, 1 for determined period and 0 otherwise. $\varepsilon_{it}$ is assumed to be normally distributed $N(0,1)$.
- $\vartheta$, $\beta$, $\rho$ and $\varnothing$ are parameters of coefficients that estimate and test the impact of globalization on income inequality.

In this section, we will survey the most commonly used techniques of dynamic panel data models (Difference and System GMM models) and explain why we have finally chosen to apply the System GMM estimators with Stata-comment ‘xtbaond2’.

To deal with equation (1), according to Roodman (2009, 86), there are several major problems which cannot be eliminated by using static panel data models. First, it is related to endogenous problems, meaning there is dual causality between the explanatory variables $\text{Glob}_{it}$, and the dependent variable $\text{gini}_{it}$, and explanatory variables $\text{Glob}_{it}$ that are not strictly exogenous, meaning they are correlated with past and possibly current occurrences of the error. Second, it is related to the fixed individual effects, meaning that country effects $u_i$ may be correlated with the explanatory variables $\text{Glob}_{it}$. The country effects are contained in the unobserved country-specific effects $\nu_{it}$, which is also an error term $\varepsilon_{it}$. Third, it is related to autocorrelation, meaning that one left-hand-side variable $\text{gini}_{it}$ is dynamic, depending on its own past occurrences. Finally, it is related to the ‘small T, large N’ panels, meaning few time periods and many individuals. In order to overcome all these potential problems, this paper uses the System GMM models developed by Arellano and Bond (1991) and Arellano and Bover (1995)/Blundell and Bond (1998). The strategies are as follows:
To eliminate the first problem, instead of using Two-Stage Least Squares (2SLS) Regression Analysis, this paper uses the difference GMM model by adding lagged levels of the endogenous determinants of explanatory variables. This results in endogenous predetermined variables that are not, therefore, correlated with the error term. The dynamic panel data model with the predetermined and strictly exogenous factors whereas the parameter coefficient of dynamic regressor is derived from the dynamic fixed effects (FE) model as follows:

$$\vartheta_{FE} = \frac{\sum_t^T \sum_i^N (gini_{it} - \overline{gini}_i)(gini_{it} - \overline{gini}_{it-1})}{\sum_t^T \sum_i^N (gini_{it} - \overline{gini}_{it-1})^2},$$ (2)

$$\overline{gini}_i = T^{-1} \sum_t^T gini_{it}$$ (3)

$$\overline{gini}_{it-1} = T^{-1} \sum_t^T gini_{it-1}$$ (4)

For the GMM model with exogenous and predetermined factors:

- For strictly exogenous variables:
  
  $$E[Glob_{it}, \varepsilon_{it}] = 0 \text{ for all } s \text{ and } t$$

- For predetermined variables (not strictly exogenous):
  
  $$E[Glob_{it}, \varepsilon_{it}] = 0 \text{ for all } s \leq t \text{ and }$$

  $$E[Glob_{it,j}, \varepsilon_{it}] = 0 \text{ if } j = 1, \ldots, t - 1$$

Moreover, to deal with the second problem (‘country effects’ and ‘time effects’), the difference GMM uses first-difference to remove both ‘constant terms’ and ‘individual effects’ because the equation no longer considers changes in time or country.

$$\Delta gini_{it} = \Delta \alpha + \vartheta \times \Delta gini_{it-1} + \beta \times \Delta Glob_{it} + \rho \times \Delta Glob_{it} + \varrho \times \Delta W_{it}$$

$$+ \sum_{T=1}^T \phi_T \times \Delta y_{it-T} + \Delta v_{it}$$ (5)

Where, $$\Delta v_{it} = \Delta u_i + \Delta \varepsilon_{it}$$ (6)

or

$$v_{it} - v_{i,t-1} = (u_i - u_i) + (\varepsilon_{it} - \varepsilon_{i,t-1}) = \varepsilon_{it} - \varepsilon_{i,t-1}$$ (7)

With this method, we could also remove the third problem (serial correlation) because the first-differenced lagged dependent variable is dependent on its past level. Rationally, the choice of the Arellano-Bond model is optimal because this method is designed for small-T and large-N panels. The final problem is thus eliminated.

It is important to note that two types of GMM model have been frequently used. Firstly, the First-Difference GMM model, developed by Arellano and Bond (1991), uses first-differenced equations with suitable lagged levels as instruments. Secondly, the System GMM model, developed by Arellano and Bover (1995), and Blundell and Bond
(1998), uses levels with lagged first difference as instruments. According to Roodman (2009), the System GMM model helps to increase efficiency with a panel data set containing a large number of countries because it allows more instruments to be used than Difference GMM models.

For our model, we also applied two diagnostic statistical tests (the Sargan test of over-identifying restrictions to test the validity of instrument variables and the Arellano-Bond test of autocorrelation). The Sargan test has a null hypothesis of ‘$H_0$: the instruments employed are valid’ while the Arellano-Bond test has a null hypothesis of ‘$H_0$: no second autocorrelation’. We rejected the null hypothesis if $p$ - Value is smaller than 5%. Therefore, the higher $p$ - Value, the better the overall model.

4.2. Robustness checks and sample restriction

To deal with missing values, especially in the Gini coefficient, we used linear interpolation between the available years.

We also checked the specification errors, which are potentially related to (a) choosing incorrect explanatory variables $\text{Glob}_it$, (b) existing omitted variables, and (c) the presence of multicollinearity (Studenmund 2014). In order to deal with these issues, we used the following strategies. First, to make sure that our explanatory variables are correctly chosen, we applied four criteria which those variables are required to respect: theoretical foundation, t-test, adjusted R2 and bias. Next, to deal with the problem of omitted variables where we might forget to include one of the relevant explanatory variables, we decided to include some observable control variables $W_{it}$, which are theoretically correlated to the dependent variable $\text{gini}_{it}$. Lastly, there might be another potential problem related to multicollinearity. This is related to the fact that the explanatory variable is a linear function of no other explanatory variables (Studenmund 2014). In order to detect this problem, we performed a simple correlation coefficient analysis. If there is high correlation coefficient between the explanatory variables, we would drop the explanatory variable that is less correlated with our dependent variable. However, as shown in Appendix A10, we did not find any high correlation coefficients.

Last, but not least, we also considered the heterogeneity issue, where the effect of globalization might be different depending on the country’s profile. For that reason, the analysis was also performed on sub-groups of both Asian and Western countries. We identified four groups of countries: high-income Asian countries, low-income Asian countries, EU member states and other Western Anglo-Saxon countries.

4.3. Comparing the effects by sub-groups of countries – Asia and the west

The classification of Asian countries is based on the World Bank (2015) estimation of gross national income (GNI) per capita for the previous year. We divided our sample into two groups: high-income Asian countries with a per capita income greater than USD 4,125 and the remaining Asian countries with per capita income lower than USD 4,125. The high-income Asian countries group includes China, Japan, South Korea, Malaysia, the Maldives, Singapore and Thailand. The low-income Asian countries group includes Bangladesh, Bhutan, Cambodia, India, Indonesia, the Lao PDR, the Federated States of Micronesia, Mongolia, Nepal, Pakistan, the Philippines, Sri Lanka, Timor-Leste, Tonga and Vietnam.
We divided Western countries into two groups: EU member states and Anglo-Saxon countries. The EU member states group includes Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. The Anglo-Saxon countries group includes the United States of America, the United Kingdom, Canada, Australia and New Zealand.

In our econometric model, we used a dummy variable to estimate the effects by group of countries. The countries in each group in turn are set to 1/0, and the remainder are used as the reference. We then used an interaction term between the dummy variable and the variable instrument of our explanatory variables.

5. Empirical results and discussion

Table 1 reports detailed regression results of dynamic panel data models from a panel data set of 52 Asian and Western countries during the period 1988 to 2014. The estimation will be explained in three parts: the effect of traditional macroeconomic variables of globalization; the effect of sectoral export diversification and manufacturing specialization, and the effect of high-technology exports on income inequality.

The advanced estimations of dynamic panel data models provide accurate outcomes by considering the robustness of the overall model, based on statistical tests and the significance level of the regressors. Since the study contains a large number of countries, resulting in a large number of observations, we decided to choose the estimated results of the one-step System GMM estimation in Model 1 and 2 in Table 1 to represent the best model. We also reported two statistical tests: the Sargan test of over-identifying restriction and the Arellano-Bond test for autocorrelation. At the bottom of the table, we obtained satisfactory results. The model therefore suggests that the identified restrictions are valid.

Most of the control variables have the expected sign and are statistically significant, especially when we computed the estimation for sub-groups of countries. The results predicted by Kuznet’s (1955) inverted ‘U’ hypothesis, are verified. The GDP per capita does increase income inequality during the first stage of economic development but decreases it in the long term. This result confirms the fact that there is a rising number of people joining the global middle class, thanks to an increase in the living standards of Asian people, especially in China and India, which together account for 36.41% of global population. According to Kishore (2014, 23), the global middle class is defined as ‘those households with daily expenditures between $10 and $100 per person in PPP terms. This excludes those who are considered poor in the poorest advanced countries and rich in the richest advanced countries’. Because high demographic growth has enabled strong economic growth, especially in Asian countries, an increase in population does not lead to an increase in income inequality. Similarly, higher public spending does decrease income inequality, which is consistent with the explanation in the literature. Furthermore, there is no statistically significant impact of trade openness, FDI, manufacturing specialization or high-technology exports on income inequality if we computed the estimation for all 52 countries. In the same way, sectoral export diversification is the significant reason for inequality. To see the impact of these variables on income inequality at the level of sub-groups of countries, we will look at the following results:
5.1. Distributional effect of traditional macro-economic globalization

There is no significant impact of trade openness on inequality in high-income Asian countries or Anglo-Saxon countries. However, more globalized forces, acting through trade openness, significantly increase income inequality in low-income Asian countries and decrease income inequality in EU member states. With the estimated results, a one percentage point rise in trade openness increases income inequality by 0.0093 percentage points in low-income Asian countries and decreases it by 0.01158 percentage points in EU member states.

According to Chusseau and Hellier (2012), the positive association of trade openness on income inequality in developing countries could have several causes, such as

Table 1. Econometric regression results – system GMM models. Dependent variable: Gini coefficient.

| Detailed econometric results for dynamic panel-data models | System GMM models One Step | System GMM models Two Steps |
|-----------------------------------------------------------|-----------------------------|-----------------------------|
| Lagged income inequality variable                         |                             |                             |
| Lagged Gini index                                          | 0.9284577***               | 0.8915075***                |
|                                                            | (0.0192227)                | (0.016872)                  |
| Traditional macro-economic variables of globalization     |                             |                             |
| Trade openness (% of GDP)                                  | −0.0004993                 | 0.0005146                   |
|                                                            | (0.0015724)                | (0.0011384)                 |
| Asian – high income countries                              | −0.0032042                 | 0.0072093                   |
|                                                            | (0.0036592)                | (0.0204117)                 |
| Asian – low income countries                               | 0.0093496***               | −0.0155952                  |
|                                                            | (0.0040157)                | (0.0544992)                 |
| West – EU members                                          | −0.011577***               | −0.0290521*                 |
|                                                            | (0.0036782)                | (0.0151994)                 |
| West – Anglo-Saxons countries                              | −0.0077711                 | 0.1497955                   |
|                                                            | (0.0153719)                | (0.3428064)                 |
| Foreign direct investment (% of GDP)                       | −0.0190146                 | −0.023141***                |
|                                                            | (0.0118145)                | (0.0055379)                 |
| Asian – high income countries                              | 0.0658046                  | 0.1266684                   |
|                                                            | (0.0489999)                | (0.1197805)                 |
| Asian – low income countries                               | −0.0092201                 | 0.2003684                   |
|                                                            | (0.0445124)                | (0.2042395)                 |
| West – EU members                                          | −0.0117037                 | −0.0023581                  |
|                                                            | (0.010052)                 | (0.0119078)                 |
| West – Anglo-Saxons countries                              | −0.0513926                 | −0.2478192                  |
|                                                            | (0.0702415)                | (0.2506619)                 |
| Sectoral export diversification and manufacturing specialization variables | 0.3313188***               | 0.3284876***                |
|                                                            | (0.145771)                 | (0.1073987)                 |
| Export diversification index                               | 3.292459***                | 11.36035                    |
|                                                            | (1.141297)                 | (12.34427)                  |
| Asian – high income countries                              | −0.1786123                 | 2.147837                    |
|                                                            | (0.1376043)                | (4.667374)                  |
| Asian – low income countries                               | 0.7086623***               | −3.456949*                  |
|                                                            | (0.2518751)                | (1.927352)                  |
| West – EU members                                          | 0.0156349                  | −7.076157                   |
|                                                            | (0.4126275)                | (11.05928)                  |
| West – Anglo-Saxons countries                              | 0.1327906                  | 0.2701709                   |
|                                                            | (0.3288402)                | (0.756567)                  |

(continued).
Table 1. Continued.

### Detailed econometric results for dynamic panel-data models

|                                | Model 1                  | Model 2                  | Model 3                  | Model 4                  |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| **System GMM models One Step** |                          |                          |                          |                          |
| Asian – high income countries  | $-4.80709^{***}$         | $-28.45405$              |                          |                          |
|                                | $(1.445931)$             | $(19.0583)$              |                          |                          |
| Asian – low income countries   | $0.5889049$              | $-1.712902$              |                          |                          |
|                                | $(0.4085858)$            | $(7.416688)$             |                          |                          |
| West – EU members              | $-0.9293175^{**}$        | $2.311762$               |                          |                          |
|                                | $(0.4544822)$            | $(4.533328)$             |                          |                          |
| West – Anglo-Saxons countries  | $0.0245096$              | $22.99717$               |                          |                          |
|                                | $(1.187374)$             | $(21.0696)$              |                          |                          |
| **High-technology exports variables** |                      |                          |                          |                          |
| High-technology exports (% of manufactures) | $0.0061026$              | $0.0020891$              |                          |                          |
|                                | $(0.0078254)$            | $(0.0050806)$            |                          |                          |
| Asian – high income countries  | $-0.0515957$ (0)        | $-0.2291914$ (0)        |                          |                          |
| Asian – low income countries   | $0.0088252$              | $0.1539319$              |                          |                          |
|                                | $(0.0061558)$            | $(0.2133728)$            |                          |                          |
| West – EU members              | $0.0168351$              | $0.2469966^{**}$        |                          |                          |
|                                | $(0.0154891)$            | $(0.1018587)$            |                          |                          |
| West – Anglo-Saxons countries  | $0.0232859$              | $0.0346294$              |                          |                          |
|                                | $(0.0480904)$            | $(0.1668369)$            |                          |                          |
| **Control variables**          |                          |                          |                          |                          |
| GDP per capita                 | $6.876849^{**}$          | $8.600523^{**}$          | $16.95386^{***}$         | $-9.321259$              |
|                                | $(3.391828)$             | $(3.575491)$             | $(5.422955)$             | $(40.36942)$             |
| GDP per capita squared         | $-0.806737^{*}$          | $-0.969614^{**}$         | $-2.05809^{***}$         | $1.377349$               |
|                                | $(0.41477)$              | $(0.4403612)$            | $(0.6823833)$            | $(4.776918)$             |
| Population growth              | $-0.0890517$             | $-0.2232918^{**}$        | $-0.0823466^{**}$        | $-0.4687875$             |
|                                | $(0.0907219)$            | $(0.0936435)$            | $(0.0401026)$            | $(0.2929065)$            |
| Public spending (% of GDP)     | $-0.0075301$             | $-0.0106637^{*}$         | $-0.010004^{***}$        | $-0.0659482$             |
|                                | $(0.0052152)$            | $(0.0063444)$            | $(0.0034683)$            | $(0.0563335)$            |
| Constants                      | $-12.65235^{*}$          | $-14.61557^{**}$         | $-32.6126^{***}$         | $29.35675$               |
|                                | $(7.26899)$              | $(7.354544)$             | $(11.08062)$             | $(81.63771)$             |
| Number of observations         | 542                      | 542                      | 542                      | 542                      |
| Number of instruments          | 243                      | 477                      | 243                      | 477                      |
| Number of groups               | 43                       | 43                       | 43                       | 43                       |
| Sargan test of overid. Restrictions | $244.44$                | $453.28$                 | $244.44$                 | $453.28$                 |
| (p-value)                      | $(0.275)$                | $(0.461)$                | $(0.275)$                | $(0.461)$                |
| Arellano-Bond test of autocorrelation (p-value) | $(1.03)$                 | $0.78$                   | $0.92$                   | $0.87$                   |
|                                | $(0.302)$                | $(0.435)$                | $(0.356)$                | $(0.384)$                |

Note: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.
Data in parentheses indicates standard errors.
Data from 1988 to 2015 in 52 Asian and Western countries.
Asian – high income countries: China, Japan, Korea, Rep., Malaysia, Maldives, Singapore and Thailand.
Asian – low income countries: Bangladesh, Bhutan, Cambodia, India, Indonesia, Lao PDR, Micronesia, Fed. Sts.,
Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Tonga and Vietnam.
West – EU members: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France,
Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal,
Romania, Slovakia, Slovenia, Spain and Sweden.
West-Anglo-Saxons countries: United States of America, United Kingdom, Canada and Australia.
Source: Author’s estimation.

an increase in FDI and MNEs allowing faster technological transfers from advanced economies to developing economies and high demands for skilled labour. Numerous articles in the literature emphasize a positive link between trade openness and income
inequality in developing countries. Beyer, Rojas, and Vergara (1999) showed that the skilled-wage premium, i.e. the income gap between skilled and unskilled workers, is widening in Chile due to trade liberalization. Barro (2000) discovered a positive and significant effect of the trade openness ratio on income inequality based on between-country data. Galiani and Sanguinetti (2003) found a significant positive relationship between import penetration and the skilled-wage premium in Argentina during the 1990s. Gonzaga, Menezes, and Terra (2006) used disaggregated data for 50 industries and show that the skilled-wage premium decreased during the period of trade liberalization in Brazil. Goldberg and Pavcnik (2007) found that the impact of trade openness on inequality is the same in developing countries as it is varied in term of differences in trade patterns before and after liberalization.

On the other hand, effective social protection and redistribution policies might be a major reason why globalized forces are transformed to decrease income inequality in EU member states. According to Stiglitz (2012), inequality is largely a result of policies. France and Norway are examples of OECD countries that have managed by and large to resist the trend of increasing inequality. European countries with public health care systems succeed much better in achieving equality of health outcomes than economic outcomes.

In the case of FDI, there is no significant impact in any of the country sub-groups. As explained in the section on related literature, the small or insignificant impact of FDI might be due to skill-biased technological progress, institutional changes, the rising size of emerging countries, and the role of MNEs. To investigate more deeply, we will analyse the results of the effect of sectoral export diversification and manufacturing specialization.

5.2. Distributional effect of the export diversification and specialization index

The export diversification index has a positive impact on income inequality. This means that a higher level of sectoral export diversification leads to a higher level of income inequality. Since there are many sub-sectors in global exports in each country, we will look in detail at whether a country specializing in manufacturing sectors generates positive or negative income inequality. The estimated results show that the higher the level of manufacturing specialization in a country, the higher the likely level of income inequality in that country.

It is also interesting to compare the influence of the export diversification index and the Balassa revealed comparative advantage index of manufactured goods among sub-groups of countries. The estimated results report that an increase of one percentage point in export diversification increases income inequality by 3.29 percentage points in high-income Asian countries and 0.708 percentage points in EU member states. At the same time, a one-percentage point rise in manufacturing specialization decreases income inequality by 4.807 percentage points in high-income Asian countries and 0.929 percentage points in EU member states. However, we did not obtain statistically significant impacts in low-income countries or Anglo-Saxon countries.

The unexpected sign of the Balassa revealed comparative advantage index of manufactured goods should be a significant reason for further research to determine the effect of a higher level of disaggregation of manufacturing specialization to avoid endogenous problems of high-skilled and low-skilled labour factors in this indicator. Currently, there
are 22 sub-categories of manufacturing specialization. Since each sector has different degrees of labour skill, capital and technology requirements, their impacts might be different.9

5.3. **Distributional effect of high-technology exports**

Table 1 also reports the estimated marginal impact of high-technology exports on income inequality. Surprisingly, we did not find any statistically significant impact of this variable, even in the case of sub-groups of countries. One of the possible reasons might be from skill-biased technological progress (Krugman and Lawrence 1993; Krugman 1994; Männasoo and Meriküll 2014). Although we could not capture statistically significant coefficients, we did obtain the expected sign, except for high-income Asian countries. It shows that a higher level of high-technology exports increases income inequality. On average, an increase in technological change increases income inequality (Subir et al. 2007). According to Brown and Cambell (2002), investment in new technology in one country, for instance in Information and Communication Technologies (ICT), modifies the demand from lower-skilled workers to more highly-skilled workers. The ICT might consequently increase income inequality in that country. The effect of technological changes on income distribution might vary from one group of countries to another. In developing countries, technology is a major driving factor while it might have a lower impact in advanced countries. According to Chu (2010) and Jones and Williams (2000), promoting investment in Research and Development (R&D) and patent protection is also a major factor in increasing income inequality since it results in an increase in the return on assets for top earners. To enhance shared prosperity generated from globalization, it is recommended that education be promoted because this economic level could allow a greater proportion of the population to be engaged in high-skilled sectors. In developing countries, the fact that a large proportion of the population has moved from the agricultural sector to the industrial sector is expected to reduce income inequality as low-income citizens could increase their overall income.

6. **Conclusion**

This paper investigates the dynamic effect of sectoral export diversification (measured by the export diversification index) and manufacturing specialization (measured by the Balassa revealed comparative advantage index of manufactured goods) on income inequality (measured by the Gini coefficient) with a panel data set including 52 Asian and Western countries for the period from 1988 to 2014. The analysis is also performed on subgroups of countries: high-income Asian countries, low-income Asian countries, EU member states and Anglo-Saxon countries. The empirical analysis uses dynamic panel data system GMM models. By taking into account two statistical tests, the Sargan test of overidentification of restrictions of instruments and the Arellano-Bond test of autocorrelation, the Arellano and Bond (1991) and Arellano and Bover (1995)/Blundell and Bond (1998) linear GMM estimators provide accurate results.

In overall terms, the results suggest insignificant distributional effects of trade openness, FDI, manufacturing specialization and high-technology exports as percentage of manufactured exports on income inequality in 52 Asian and Western countries whereas sectoral export diversification has been the motivating factor leading to higher inequality. When sub-groups of countries are analysed, sectoral export diversification increases
inequality, but manufacturing specialization decreases inequality in both high-income Asian countries and EU member states. In the same way, there is no statistically significant effect of high-technology exports on inequality in any sub-group of countries. In this perspective, policy implications concern the implementation of industrial policy in order to develop basic manufactured specializations (unskilled labour).

For the policy implications, in the most advanced economies, i.e. Western countries, there is a rising belief that globalizing forces are not all good; people, not only ordinary citizens but also policy makers, think that life was better in the old days and that the fruits of globalization might go only to top earners and the rest of the world (Alex 2017; Andrea 2017). Negative feelings about globalization and international cooperation among many low- and middle-class citizens might be one of the major reasons that led to the political shocks of Brexit and Trump in 2016. At the same time, we also observed various social trends occurring in Western countries over the last few decades, such as stagnant wages, an overall decline in social mobility, a loss of sense of togetherness and a growing mentality of ‘us against them’ (Tharman 2017), and, consequently, there are endless debates about the rise of the Top 0.01% or Top 0.1% or Top 1% (Piketty, Stiglitz, Krugman, Deaton & Oxfam since the 2010s). However, based on the results of empirical investigation in this paper, we found that the effect of globalization does not increase within-country income inequality in Western countries but decreases it, especially in EU member states. In other words, the effect of globalization should not be a major cause for concern in relation to inequality in Western countries. Therefore, we might suspect that the political upsets of globalization might also be related to the rest of the world. In this case, because citizens’ welfare is evaluated relatively not only within their country but also in comparison with the rest of the world, the west needs to come up with a new domestic and global social contract. In order to compete in the global single market where we found a higher degree of competitiveness from emerging economies such as China, India, and Indonesia, de-globalization is not a better choice. It might have disastrous consequences for the world and maybe higher negative impacts for advanced Western countries.

Leading Asian commentators, on the one hand, have viewed globalization as a positive mechanism in promoting economic growth, reducing poverty, and increasing living standards among both the low and middle classes, along with the belief that globalizing forces will allow those emerging economies to catch up with advanced countries. This is what is predicted by the growth theory of Nobel Prize winner Robert Solow (Solow 1956), and the great economic historian, Angus Maddison. On the other hand, there is concern that the fruits of globalization are not distributed equally, in particular, the benefits might not reach the poorest in each country. This might result in widening income inequality both within and between countries, which would in turn be a major challenge for economic, social and political progress. For example, just looking at one group of countries, there is huge inequality among the members of the ASEAN. The GDP per capita of Singapore is nearly 37 times higher than the average GDP per capita of the CLMV (Cambodia, Laos, Myanmar and Vietnam) countries. This has also required Asian countries to rethink their model of social and economic development that used to focus mainly on economic growth alone, ignoring the majority of people who are still vulnerable due to living in poverty.

In this paper, the estimated results, examining dynamic panel data models, provide significant insight to better understand the effect of less-explored areas of sectoral export diversification and manufacturing specialization on income inequality in both Asian and
Western countries. However, there remain many crucial questions for further research. First, the Gini coefficient is always the first choice when measuring income inequality; however, if the study wishes to expand to more developing countries, like those in Asia, the large number of missing values becomes of greater concern. Although we could deal with this problem by using reliable statistical methods, it might still produce results that are unrepresentative of reality. That is why we might consider using ‘The World Wealth and Income Database (WID.world)’, first developed by Piketty and Zucman (2013, 2014), which is currently available in many more countries. Second, while using the Balassa revealed comparative advantage index of manufactured goods, we have not taken a closer look at 22 sub-categories, especially in quality- and high-technology-intensive sectors. Studying a high level of aggregation of this indicator may possibly give more fragile results. Third, we could not find any statistically significant coefficients for Anglo-Saxon countries. We suspected that this is because the database contains a small number of observations. Fourth, we might consider comparing the effects in South American countries, whose level of economic development is parallel to that of the Asian economies. Last, but not least, sectoral export specialization in agricultural and service sectors in developing countries should be taken into consideration since agricultural sectors play a significant role in many developing countries in Asia and service sectors are increasing in significance.

Notes

1. The expression ‘Asian countries, namely the world’s greatest emerging economies and Western countries, namely the world’s greatest economies’ can be found in the Financial Times’s book of the year 2014: ‘The Great Convergence: Asia, the west, and the Logic of One World’ by Kishore Mahbubani. The author is listed as one of the top 100 global thinkers in 2005, 2010 and 2011 in Foreign Policy and one of Prospect Magazine’s top 50 world thinkers in 2014.

2. Please see Appendix 3 for detail of Kuznets’ hypothesis (1955) and Imbs & Wacziarg’s hypothesis (2003).

3. The authors used term ‘Economic complexity’ to measure the sophistication of a country’s productive structure by combining information on the diversity of a country (the number of products it exports), and the ubiquity of its products (the number of countries that export that product). This followed the model of Hidalgo and Hausmann (2009).

4. Please see more detail in Appendix 2, which shows list of countries.

5. ASEAN: Association of South-East Asian Nations.

6. According to WITS (2016), the manufacturing sector is only one among ten other sectors, measured by the Balassa revealed comparative advantage index, including food, fuel, ores and metals, textiles, machinery and transport equipment, raw materials, intermediate goods, consumer goods, capital goods and chemicals.

7. It is well established in econometric literature that the static panel estimations (Pooled Ordinary Least Squares ‘OLS’ model, fixed effects ‘FE’ model, and random effects ‘RE’ model) are not appropriate for dynamic panel data. Therefore, only dynamic panel data estimations (Difference and System GMM models) are discussed in this paper.

8. Kishore (2007) defines the term ‘the west’ as referring to the following countries: EU member states, the United States of America as well as the Anglo-Saxon states of Australia, Canada, and New Zealand because of Western cultural, economic and political parallels and ‘the Asian’ countries refers to every country located in Asia.

9. According to the World Trade Organization, there are 22 sub-categories of the Balassa revealed comparative advantage index of manufactured goods. These include: 15 – Manufacture of food products and beverages; 16 – Manufacture of tobacco products; 17 – Manufacture of textiles; 18 – Manufacture of wearing apparel; dressing and dyeing of fur; 19 – Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear; 20 – Manufacture of wood and
of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials; 21 – Manufacture of paper and paper products; 22 – Publishing, printing and reproduction of recorded media; 23 – Manufacture of coke, refined petroleum products and nuclear fuel; 24 – Manufacture of chemicals and chemical products; 25 – Manufacture of rubber and plastics products; 26 – Manufacture of other non-metallic mineral products; 27 – Manufacture of basic metals; 28 – Manufacture of machinery and equipment n.e.c.; 30 – Manufacture of office, accounting and computing machinery; 31 – Manufacture of electrical machinery and apparatus n.e.c.; 32 – Manufacture of radio, television and communication equipment and apparatus; 33 – Manufacture of medical, precision and optical instruments, watches and clocks; 34 – Manufacture of motor vehicles, trailers and semi-trailers; 35 – Manufacture of other transport equipment; 36 – Manufacture of furniture; manufacturing n.e.c.; and 37 – Recycling.

10. For more detail, please see Appendix 11, which describes a survey of citizen's attitudes towards globalization.

11. It is worth noting that not everyone has seen Brexit and Trump as political shocks or upsets, but here we have decided to take into consideration only leading views from top public intellectuals who have agreed on the use of this term, such as Piketty, Stiglitz, Krugman, Deaton and Kishore.

12. Author's estimation based on the World Bank database in 2014.

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## Appendix A1: Variable definitions and sources

| Variable                        | Description                                                                                                                                                                                                 | Sources                                                                                                                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gini coefficient                | We use ‘Gini coefficient’ to measure income inequality. Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality (World Bank definition, 2017). | World Bank, Development Research Group. Data are based on primary household survey data obtained from government statistical agencies and World Bank country departments. |
| Openness to trade (% of GDP)    | Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product (World Bank definition, 2017).                                                                      | World Bank national accounts data, and OECD National Accounts data files.                                                                                                                                                                |
| Foreign direct investment (% of GDP) | Foreign direct investment, net inflows (% of GDP). Foreign direct investment are the net inflows of investment to acquire a lasting management interest (10% or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors, and is divided by GDP (World Bank definition, 2017). | International Monetary Fund, International Financial Statistics and Balance of Payments databases, World Bank, International Debt Statistics, and World Bank and OECD GDP estimates. |
| Export diversification index    | The product export diversification index is measured by Theil index, calculated by IMF staff under an IMF-DFID research collaboration. The data is covering 187 countries from 1962–2010. The data is from the UN–NBER dataset, which harmonizes COMTRADE bilateral trade flow data at the 4-digit SITC (Rev. 1) level. | International Monetary Fund, UN–NBER dataset, and COMTRADE bilateral trade flow data.                                                                                                                                                      |
| Revealed Comparative Advantage Balassa Index in Manufactures | The data is gotten from World Bank, calculated by World Integrated Trade Solution staff, using Revealed Comparative Advantage Balassa Index in Manufactures product sectors among the 10 others sectors (food, fuel, ores and metals, textiles, machinery and transport equipment, raw materials, intermediate goods, consumer goods, capital goods and chemicals). It is covering all countries in the World from 1988 to 2014. | World Integrated Trade Solution (WITS), and World Bank.                                                                                                                                                               |
| High-technology exports (% of manufactured exports) | High-technology exports are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery (World Bank definition, 2017). | World Bank, United Nations, and Comtrade database through the WITS platform.                                                                                                                                               |

(continued)
GDP per capita, PPP (current international $)

GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars (World Bank definition, 2017).

Population growth (annual %)

GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current international dollars based on the 2011 ICP round. (World Bank definition, 2017).

Public spending (% of GDP)

Expense is cash payments for operating activities of the government in providing goods and services. It includes compensation of employees (such as wages and salaries), interest and subsidies, grants, social benefits, and other expenses such as rent and dividends (World Bank definition, 2017).

Country group

By income classification (time-variant variables): high- and low-income countries
By geographical classification (time-invariants variables): Asian countries and Western countries.

Note: Data from 1988 to 2014 in 52 Asian and Western countries. Source: Author’s determination.
Appendix A2: List of countries

| Country group   | Sub-groups of countries            | Name of countries                                                                 |
|-----------------|------------------------------------|----------------------------------------------------------------------------------|
| Asian countries | Asian – high income countries      | China, Japan, Korea, Rep., Malaysia, Maldives, Singapore and Thailand             |
|                 | Asian – low-income countries       | Bangladesh, Bhutan, Cambodia, India, Indonesia, Lao PDR, Micronesia, Fed. Sts., Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Tonga and Vietnam |
| Western countries| West – EU members                  | Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden |
|                 | West – Anglo-Saxons countries      | United States of America, United Kingdom, Canada and Australia                    |

Note: Data from 1988 to 2014 in 52 Asian and Western countries.
Source: Author’s determination.

Appendix A3: Kuznets hypothesis (1955) and Imbs & Wacziarg hypothesis (2003)

a) Kuznets hypothesis (1955)

b) Imbs & Wacziarg hypothesis (2003)
### Appendix A4: The 52 Asian and Western countries (UN member states) in 2014

**a) The 52 Asian and Western countries and their global shares**

| Country Name | POP. (in million) | % of global share | GDP. (in $ billion) | % of global share | EX. (in $ billion) | % of global share | IM. (in $ billion) | % of global share | Average (% of global share) |
|--------------|-------------------|-------------------|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------------|
| **Asian – high-income countries** | | | | | | | | | |
| China        | 1 364.3           | 18.77%            | 10 482.4            | 13.29%            | 2 342.3           | 12.25%            | 1959.2            | 10.27%            | 13.64%                   |
| Japan        | 127.3             | 1.75%             | 4 848.7             | 6.15%             | 690.2             | 3.61%             | 812.2             | 4.26%             | 3.94%                    |
| Korea, Rep.  | 50.8              | 0.70%             | 1 411.3             | 1.79%             | 572.7             | 2.99%             | 525.5             | 2.75%             | 2.06%                    |
| Malaysia     | 30.2              | 0.42%             | 338.1               | 0.43%             | 233.9             | 1.22%             | 208.9             | 1.09%             | 0.79%                    |
| Singapore    | 5.5               | 0.08%             | 308.1               | 0.39%             | 409.3             | 2.14%             | 366.2             | 1.92%             | 1.13%                    |
| Thailand     | 68.4              | 0.94%             | 406.5               | 0.52%             | 227.5             | 1.19%             | 227.7             | 1.19%             | 0.96%                    |
| Maldives     | 0.4               | 0.006%            | 3.1                 | 0.003%            | 0.3               | 0.002%            | 2.0               | 0.01%             | 0.01%                    |
| **Asian – low-income countries** | | | | | | | | | |
| Micronesia   | 0.1               | 0.001%            | 0.3                 | 0.0004%           | 0.03              | 0.0002%           | 0.2               | 0.001%            | 0.001%                   |
| Indonesia    | 255.1             | 3.51%             | 890.8               | 1.13%             | 176.3             | 0.92%             | 178.2             | 0.93%             | 1.62%                    |
| Cambodia     | 15.3              | 0.21%             | 16.8                | 0.22%             | 6.8               | 0.04%             | 11.9              | 0.06%             | 0.08%                    |
| Lao PDR      | 6.6               | 0.09%             | 13.3                | 0.22%             | 2.7               | 0.01%             | 4.3               | 0.02%             | 0.04%                    |
| Mongolia     | 2.9               | 0.04%             | 12.2                | 0.22%             | 5.8               | 0.03%             | 5.2               | 0.03%             | 0.03%                    |
| Philippines  | 100.1             | 1.38%             | 284.6               | 0.36%             | 62.1              | 0.3%              | 67.7              | 0.35%             | 0.60%                    |
| Timor-Leste  | 1.2               | 0.02%             | 1.4                 | 0.002%            | 0.02              | 0.00008%          | 0.9               | 0.005%            | 0.006%                   |
| Tonga        | 0.1               | 0.001%            | 0.4                 | 0.0006%           | 0.02              | 0.0001%           | 0.2               | 0.001%            | 0.00%                    |
| Vietnam      | 90.7              | 1.25%             | 186.2               | 0.24%             | 150.2             | 0.79%             | 147.8             | 0.78%             | 0.76%                    |
| Bangladesh   | 159.4             | 2.19%             | 172.9               | 0.22%             | 30.4              | 0.16%             | 42.3              | 0.22%             | 0.70%                    |
| Bhutan       | 0.8               | 0.01%             | 1.95                | 0.002%            | 0.6               | 0.003%            | 0.9               | 0.005%            | 0.005%                   |
| India        | 1293.9            | 17.79%            | 2 035.4             | 2.58%             | 322.7             | 1.69%             | 462.9             | 2.43%             | 6.12%                    |
| Sri Lanka    | 21.0              | 0.29%             | 79.4                | 0.10%             | 11.3              | 0.06%             | 19.4              | 0.10%             | 0.14%                    |
| Nepal        | 28.3              | 0.39%             | 20.0                | 0.03%             | 0.9               | 0.005%            | 7.6               | 0.04%             | 0.115%                   |
| Pakistan     | 185.5             | 2.55%             | 244.4               | 0.31%             | 24.7              | 0.13%             | 47.4              | 0.25%             | 0.81%                    |
| **West – EU members** | | | | | | | | | |
| Austria      | 8.5               | 0.12%             | 438.4               | 0.56%             | 178.2             | 0.93%             | 182.0             | 0.95%             | 0.64%                    |
| Belgium      | 11.2              | 0.15%             | 531.8               | 0.67%             | 472.3             | 2.47%             | 454.6             | 2.38%             | 1.42%                    |
| Bulgaria     | 7.2               | 0.10%             | 56.7                | 0.07%             | 29.3              | 0.15%             | 34.7              | 0.18%             | 0.13%                    |

(continued)
| Country Name          | POP. (in million) | % of global share | GDP. (in $ billion) | % of global share | EX. (in $ billion) | % of global share | IM. (in $ billion) | % of global share | Average (% of global share) |
|----------------------|-------------------|-------------------|--------------------|-------------------|--------------------|-------------------|--------------------|-------------------|-------------------------|
| Croatia              | 4.2               | 0.06%             | 57.1               | 0.07%             | 13.9               | 0.07%             | 22.8               | 0.12%             | 0.08%                   |
| Cyprus               | 1.2               | 0.02%             | 23.3               | 0.03%             | 1.8                | 0.01%             | 6.8                | 0.04%             | 0.02%                   |
| Czech Republic       | 10.5              | 0.14%             | 207.8              | 0.26%             | 175.1              | 0.92%             | 154.34             | 0.81%             | 0.53%                   |
| Denmark              | 5.6               | 0.08%             | 352.3              | 0.45%             | 111.5              | 0.58%             | 99.6               | 0.52%             | 0.41%                   |
| Estonia              | 1.3               | 0.02%             | 26.2               | 0.03%             | 16.1               | 0.08%             | 18.3               | 0.10%             | 0.06%                   |
| Finland              | 5.5               | 0.08%             | 272.6              | 0.35%             | 74.4               | 0.39%             | 76.7               | 0.40%             | 0.30%                   |
| France               | 66.3              | 0.91%             | 2 849.3            | 3.61%             | 580.5              | 3.04%             | 676.6              | 3.55%             | 2.78%                   |
| Germany              | 81.0              | 1.11%             | 3 879.3            | 4.92%             | 1494.6             | 7.82%             | 1207.0             | 6.33%             | 5.04%                   |
| Greece               | 10.9              | 0.15%             | 236.1              | 0.30%             | 36.03              | 0.19%             | 64.2               | 0.34%             | 0.24%                   |
| Hungary              | 9.9               | 0.14%             | 139.3              | 0.18%             | 110.6              | 0.58%             | 104.9              | 0.55%             | 0.36%                   |
| Ireland              | 4.6               | 0.06%             | 256.3              | 0.32%             | 121.9              | 0.64%             | 80.7               | 0.42%             | 0.36%                   |
| Italy                | 60.8              | 0.84%             | 2 151.7            | 2.73%             | 529.9              | 2.77%             | 474.2              | 2.49%             | 2.21%                   |
| Latvia               | 2.99              | 0.03%             | 31.4               | 0.04%             | 14.6               | 0.08%             | 17.6               | 0.09%             | 0.06%                   |
| Lithuania            | 2.93              | 0.04%             | 48.5               | 0.06%             | 32.4               | 0.17%             | 34.4               | 0.18%             | 0.11%                   |
| Luxembourg           | 0.56              | 0.01%             | 66.3               | 0.08%             | 19.2               | 0.10%             | 26.7               | 0.14%             | 0.08%                   |
| Netherlands          | 16.9              | 0.23%             | 879.6              | 1.12%             | 672.7              | 3.52%             | 589.4              | 3.09%             | 1.99%                   |
| Poland               | 38.01             | 0.52%             | 545.2              | 0.69%             | 220.2              | 1.15%             | 223.7              | 1.17%             | 0.88%                   |
| Portugal             | 10.4              | 0.14%             | 229.6              | 0.29%             | 63.8               | 0.33%             | 78.4               | 0.41%             | 0.29%                   |
| Romania              | 19.9              | 0.27%             | 199.5              | 0.25%             | 69.7               | 0.36%             | 77.8               | 0.41%             | 0.32%                   |
| Slovak Republic      | 5.4               | 0.07%             | 100.8              | 0.13%             | 86.5               | 0.45%             | 81.9               | 0.43%             | 0.27%                   |
| Slovenia             | 2.06              | 0.03%             | 49.5               | 0.06%             | 35.9               | 0.19%             | 33.9               | 0.18%             | 0.11%                   |
| Spain                | 46.5              | 0.64%             | 1 375.9            | 1.74%             | 324.5              | 1.70%             | 358.9              | 1.88%             | 1.49%                   |
| Sweden               | 9.7               | 0.13%             | 573.8              | 0.73%             | 164.6              | 0.86%             | 162.3              | 0.85%             | 0.64%                   |
| West – Anglo-Saxons countries |       |                   |                    |                   |                    |                   |                    |                   |                         |
| Australia            | 23.5              | 0.32%             | 1 459.6            | 1.85%             | 241.2              | 1.26%             | 236.9              | 1.24%             | 1.17%                   |
| United Kingdom       | 64.6              | 0.89%             | 2998.8             | 3.80%             | 505.2              | 2.64%             | 690.5              | 3.62%             | 2.74%                   |
| Canada               | 35.5              | 0.49%             | 1 792.9            | 2.27%             | 476.3              | 2.49%             | 480.0              | 2.52%             | 1.94%                   |
| United States        | 318.6             | 4.38%             | 17 393.1           | 22.05%            | 1620.5             | 8.47%             | 2412.5             | 12.64%            | 11.89%                  |
| Global share         | 7 268.99          | 64.56%            | 78 870.1           | 77.32%            | 19 122.6           | 71.98%            | 19 080.3           | 74.74%            | 72.2%                   |

Note: Data in 2014 in 52 Asian and Western countries.
POP. = Population, total – (in million).
GDP = GDP (current US$) – (in $ billion).
EX = Merchandise exports (current US$) – (in $ billion).
IM = Merchandise imports (current US$) – (in $ billion).
Average (% of global share) is calculated as average value of population, GDP, merchandise exports and merchandise imports.
Source: Author's estimation.
b) Graphic of 52 Asian and Western countries (as global share) in 2014
Population, total (as % of World Population) in 2014

Source: Author’s estimation.

GDP (current US$) (as % of World GDP) in 2014

Source: Author’s estimation.
Merchandise exports (current US$) (as % of World Merchandise exports) in 2014

- China (12.2)
- United States (8.5)
- Germany (7.8)
- Japan
- Korea, Rep.
- Malaysia
- Singapore
- Thailand
- Maldives
- Micronesia
- Indonesia
- Cambodia
- Lao PDR
- Mongolia
- Philippines
- Timor-Leste
- Tonga
- Vietnam
- Bangladesh
- Bhutan
- India
- Sri Lanka
- Nepal
- Pakistan
- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Czech Republic
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Portugal
- Romania
- Slovak Republic
- Slovenia
- Spain
- Sweden

Source: Author's estimation.

Merchandise imports (current US$) (as % of World Merchandise imports) in 2014

- China (10.3)
- United States (12.6)
- Germany (6.3)
- Japan
- Korea, Rep.
- Malaysia
- Singapore
- Thailand
- Maldives
- Micronesia
- Indonesia
- Cambodia
- Lao PDR
- Mongolia
- Philippines
- Timor-Leste
- Tonga
- Vietnam
- Bangladesh
- Bhutan
- India
- Sri Lanka
- Nepal
- Pakistan
- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Czech Republic
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Portugal
- Romania
- Slovak Republic
- Slovenia
- Spain
- Sweden

Source: Author's estimation.
Appendix A5: Percentage of global share by sub-regions of countries in 2014

| Region                           | POP.  | GDP.  | Exports | Imports | Average (% of global share) |
|----------------------------------|-------|-------|---------|---------|----------------------------|
| Asian – high income countries    | 22.66%| 22.57%| 23.41%  | 21.50%  | 22.53%                     |
| Asian – low income countries     | 29.73%| 5.02% | 4.15%   | 5.22%   | 11.03%                     |
| Asia’s global share              | 52.38%| 27.59%| 27.56%  | 26.72%  | 33.56%                     |
| West – EU members                | 6.10% | 19.75%| 29.55%  | 28.00%  | 20.85%                     |
| West – Anglo-Saxons countries    | 6.08% | 29.98%| 14.87%  | 20.02%  | 17.74%                     |
| West’s global share              | 12.18%| 49.73%| 44.42%  | 48.02%  | 38.59%                     |
| 52 Asian and Western countries’ global share | 64.56%| 77.32%| 71.98%  | 74.74%  | 72.15%                     |

Note: Data in 2014 in 52 Asian and Western countries.
POP: Population, total – (in million).
GDP: GDP (current US$) – (in $ billion).
EX: Merchandise exports (current US$) – (in $ billion).
IM: Merchandise imports (current US$) – (in $ billion).
Average (% of global share) is calculated as average value of population, GDP, merchandise exports and merchandise imports.
Source: Author’s estimation.
Appendix A6: Descriptive statistics (average from 1988 to 2014)

### Income inequality

| Variables                              | Obs. | Mean  | SD   | Min  | Max  |
|----------------------------------------|------|-------|------|------|------|
| Gini coefficient ($N = 52$)            | 895  | 35.67 | 4.75 | 19.40| 63.26|
| Asian – high income countries          | 137  | 39.99 | 6.72 | 24.50| 49.15|
| Asian – low income countries           | 283  | 36.62 | 4.97 | 27.00| 63.26|
| West – EU members                      | 401  | 30.18 | 3.96 | 19.40| 39.50|
| West – Anglo-Saxons countries          | 74   | 35.87 | 3.34 | 31.15| 41.75|

### Traditional macro-economic variables of globalization

| Variables                              | Obs. | Mean  | SD   | Min  | Max  |
|----------------------------------------|------|-------|------|------|------|
| Openness to trade (% of GDP) ($N = 52$)| 1,314| 87.19 | 53.00| 13.26| 439.66|
| Asian – high income countries          | 189  | 134.18| 108.85| 15.92| 439.66|
| Asian – low income countries           | 361  | 71.67 | 35.04| 13.26| 201.80|
| West – EU members                      | 656  | 97.76 | 51.61| 33.98| 374.15|
| West – Anglo-Saxons countries          | 108  | 45.13 | 16.50| 19.01| 82.86|
| Foreign direct investment (% of GDP) ($N = 52$) | 1,290 | 3.75 | 7.01 | -58.98 | 255.42 |
| Asian – high income countries          | 189  | 4.51  | 5.48 | -0.05| 26.52 |
| Asian – low income countries           | 373  | 2.23  | 4.49 | -32.35| 43.91 |
| West – EU members                      | 620  | 5.66  | 15.90| -58.98| 255.42 |
| West – Anglo-Saxons countries          | 108  | 2.61  | 2.15 | -3.62| 10.07 |

### Sectoral export diversification and manufacturing specialization variables

| Variables                              | Obs. | Mean  | SD   | Min  | Max  |
|----------------------------------------|------|-------|------|------|------|
| Export diversification index ($N = 52$) | 1,062| 2.44  | 0.61 | 1.14 | 5.37 |
| Asian – high income countries          | 161  | 2.66  | 0.90 | 1.74 | 5.37 |
| Asian – low income countries           | 276  | 3.39  | 0.80 | 1.81 | 4.85 |
| West – EU members                      | 533  | 1.85  | 0.40 | 1.14 | 3.33 |
| West – Anglo-Saxons countries          | 92   | 1.84  | 0.34 | 1.37 | 2.99 |
| Manufacturing specialization ($N = 52$) | 1,107| 0.95  | 0.31 | 0.03 | 1.47 |
| Asian – high income countries          | 175  | 1.08  | 0.31 | 0.05 | 1.47 |
| Asian – low income countries           | 249  | 0.89  | 0.39 | 0.03 | 1.46 |
| West – EU members                      | 584  | 1.03  | 0.18 | 0.50 | 1.34 |
| West – Anglo-Saxons countries          | 99   | 0.78  | 0.34 | 0.15 | 1.16 |

### High technology exports variables

| Variables                              | Obs. | Mean  | SD   | Min  | Max  |
|----------------------------------------|------|-------|------|------|------|
| High-tech exports as % of manufac. ($N = 52$) | 1,134| 18.44 | 11.96| 0.00 | 74.99|
| Asian – high income countries          | 156  | 32.79 | 13.70| 6.44 | 62.79|
| Asian – low income countries           | 245  | 8.99  | 17.46| 0.00 | 74.99|
| West – EU members                      | 626  | 12.04 | 8.72 | 0.40 | 47.84|
| West – Anglo-Saxons countries          | 107  | 19.95 | 7.96 | 7.07 | 34.26|
**Control variables**

| Variables                                             | Obs.   | Mean   | SD    | Min    | Max    |
|-------------------------------------------------------|--------|--------|-------|--------|--------|
| GDP per capita (current S) (N = 52)                    | 1,248  | 20,080 | 10,551| 707    | 99,732 |
| Asian – high income countries                         | 164    | 20,295 | 16,806| 986    | 83,798 |
| Asian – low income countries                          | 362    | 3,327  | 2,088 | 707    | 12,012 |
| West – EU members                                     | 622    | 24,533 | 13,711| 4,494  | 99,732 |
| West – Anglo-Saxons countries                         | 100    | 32,163 | 9,598 | 16,739 | 54,539 |
| Population growth (annual %) (N = 52)                 | 1,404  | 1.04   | 0.83  | −5.81  | 5.32   |
| Asian – high income countries                         | 189    | 1.39   | 1.15  | −1.47  | 5.32   |
| Asian – low income countries                          | 405    | 1.58   | 0.91  | −1.76  | 4.94   |
| West – EU members                                     | 702    | 0.20   | 0.84  | −5.81  | 3.73   |
| West – Anglo-Saxons countries                         | 108    | 0.98   | 0.40  | 0.22   | 2.06   |
| Public spending as % of GDP (N = 52)                   | 1,129  | 24.04  | 7.72  | 0.62   | 78.19  |
| Asian – high income countries                         | 151    | 17.18  | 4.32  | 10.81  | 32.39  |
| Asian – low income countries                          | 243    | 17.47  | 8.00  | 7.59   | 78.19  |
| West – EU members                                     | 629    | 35.66  | 11.42 | 0.62   | 63.15  |
| West – Anglo-Saxons countries                         | 106    | 25.85  | 7.12  | 16.70  | 43.48  |

Data in 2014 in 52 Asian and Western countries.
Asian – high income countries: China, Japan, Korea, Rep., Malaysia, Maldives, Singapore and Thailand.
Asian – low income countries: Bangladesh, Bhutan, Cambodia, India, Indonesia, Lao PDR, Micronesia, Fed. Sts., Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Tonga and Vietnam.
West – EU members: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.
West – Anglo-Saxons countries: United States of America, United Kingdom, Canada and Australia.
Source: Author’s estimation.
Appendix A7: Disparity in data analysis (average from 1988 to 2014)

Data from 1988 to 2014 in 52 Asian and Western countries.
Asian – high income countries: China, Japan, Korea, Rep., Malaysia, Maldives, Singapore and Thailand.
Asian – low income countries: Bangladesh, Bhutan, Cambodia, India, Indonesia, Lao PDR, Micronesia, Fed. Sts., Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Tonga and Vietnam.
West – EU members: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.
West – Anglo-Saxons countries: United States of America, United Kingdom, Canada and Australia.
Source: Author’s estimation.
Appendix A8: Trends of economic variables from 1988 to 2014

Data from 1988 to 2015 in 52 Asian and Western countries.
Asian – high income countries: China, Japan, Korea, Rep., Malaysia, Maldives, Singapore and Thailand.
Asian – low income countries: Bangladesh, Bhutan, Cambodia, India, Indonesia, Lao PDR, Micronesia, Fed. Sts., Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Tonga and Vietnam.
West – EU members: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.
West- Anglo-Saxons countries: United States of America, United Kingdom, Canada and Australia.
Source: Author’s estimation.
Appendix A9: Correlation between independent variables and inequality (1988 to 2014)

1) Gini coefficient and trade openness (% of GDP)

2) Gini coefficient and foreign direct investment (% of GDP)
3) Gini coefficient and export diversification index

4) Gini coefficient and manufacturing specialization
5) Gini coefficient and high technology exports (% of manufactured exports)

Data from 1988 to 2015 in 52 Asian and Western countries.
Asian – high income countries: China, Japan, Korea, Rep., Malaysia, Maldives, Singapore and Thailand.
Asian – low income countries: Bangladesh, Bhutan, Cambodia, India, Indonesia, Lao PDR, Micronesia, Fed. Sts., Mongolia, Nepal, Pakistan, Philippines, Sri Lanka, Timor-Leste, Tonga and Vietnam.
West – EU members: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden.
West- Anglo-Saxons countries: United States of America, United Kingdom, Canada and Australia.
Source: Author’s estimation.
## Appendix A10: Pairwise correlations of variables (1988 to 2014)

|          | GINI  | TRADE  | FDI    | DIV.  | SPEC.  | HIG. T. | GDP     | POP.  | SPEN.  |
|----------|-------|--------|--------|-------|--------|---------|---------|-------|--------|
| **GINI** | 1.0000|        |        |       |        |         |         |       |        |
| (Sig. 1%)| 895   |        |        |       |        |         |         |       |        |
| **TRADE**| 0.0888*| 1.0000|        |       |        |         |         |       |        |
| (Sig. 1%)| (0.0099)| 1314  |        |       |        |         |         |       |        |
| Nb. of Obs.| 843   |        |        |       |        |         |         |       |        |
| **FDI**  | 0.0474| −0.3549*| 1.0000|       |        |         |         |       |        |
| (Sig. 1%)| (0.1673)| 0 (0.0000)| (0.9567)| 1062 |        |         |         |       |        |
| Nb. of Obs.| 849   |        |        |       |        |         |         |       |        |
| **DIV.** | 0.2461*| 0.1678*| −0.0017| 1.0000|        |         |         |       |        |
| (Sig. 1%)| (0.0000)| (0.0000)| (0.9917)| 1019 |        |         |         |       |        |
| Nb. of Obs.| 730   |        |        |       |        |         |         |       |        |
| **SPEC.**| −0.1228*| 0.0190| −0.0329| −0.1752*| 1.0000|        |         |       |        |
| (Sig. 1%)| (0.0006)| (0.5315)| (0.2767)| (0.0000)| 1107 |        |         |       |        |
| Nb. of Obs.| 772   |        |        |       |        |         |         |       |        |
| **HIG. T.**| 0.4947*| 0.3880*| 0.0837*| 0.1635*| 1.0000|        |         |       |        |
| (Sig. 1%)| (0.0000)| (0.0000)| (0.0051)| (0.9799)| (0.0000)| 1134 |        |       |        |
| Nb. of Obs.| 773   |        |        |       |        |         |         |       |        |
| **GDP**  | −0.2229*| 0.3021*| 0.1874*| −0.6391*| 0.1202*| 0.3053*| 1.0000|       |        |
| (Sig. 1%)| (0.0000)| (0.0000)| (0.0000)| (0.0001)| (0.0000)| (0.0000)| 1248 |       |        |
| Nb. of Obs.| 844   |        |        |       |        |         |         |       |        |
| **POP.**  | 0.3180*| 0.1782*| 0.0487| 0.5516*| −0.0334| 0.2374*| −0.3184*| 1.0000|       |
| (Sig. 1%)| (0.0000)| (0.0000)| (0.0000)| (0.0000)| (0.0000)| (0.0000)| 1404 |       |        |
| Nb. of Obs.| 895   |        |        |       |        |         |         |       |        |
| **SPEN.** | −0.3907*| −0.0352*| 0.0769| −0.4158*| 0.0193| −0.1187*| 0.4248*| −0.2640*| 1.0000|
| (Sig. 1%)| (0.0000)| (0.2387)| (0.0106)| (0.0000)| (0.5410)| (0.0001)| (0.0000)| (0.0000)| (0.0000)| 1129
| Nb. of Obs.| 726   |        |        |       |        |         |         |       |        |

Note: TRADE = Openness to trade (% of GDP).
FDI = Foreign direct investment (% of GDP).
DIV. = Export diversification index.
SPEC. = Revealed comparative Balassa Index in manufactures.
HIG. T. = High-technology exports (% of manufactures).
GDP = GDP per capita, PPP (current international $).
POP. = Population growth (annual %).
SPEN. = Public spending (% of GDP).
Data from 1988 to 2014 in 52 Asian and Western countries.
Source: Author’s estimation.
Appendix A11: Fear of globalization?

a) Global attitudes towards globalizing forces:

| Country      | Getting better | Neither | Getting worse |
|--------------|----------------|---------|---------------|
| China*       | 41             | 16      | 33            |
| Indonesia*   | 23             | 28      | 42            |
| Saudi Arabia | 16             | 15      | 55            |
| UAE          | 10             | 30      | 60            |
| Denmark      | 8              | 25      | 57            |
| Norway       | 8              | 31      | 59            |
| Germany      | 10             | 20      | 66            |
| Sweden       | 11             | 17      | 69            |
| Thailand*    | 4              | 29      | 62            |
| Singapore    | 8              | 20      | 67            |
| Finland      | 6              | 20      | 65            |
| US           | 4              | 25      | 65            |
| GB           | 6              | 23      | 68            |
| Malaysia*    | 8              | 17      | 71            |
| Hong Kong*   | 3              | 25      | 70            |
| Australia    | 3              | 3       | 81            |
| France       | 3              | 11      | 81            |

*Weighted to be representative of online population

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b) Ipsos/Mori’s ‘What Worries the World’ survey:

Source: Global Advisor (2016).