



Research Article/Araştırma Makalesi

A Review on China's Exports and Crowding-Out Effects

Çin İhracatları ve Dışlama Etkisi Üzerine İnceleme

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Abstract

Export-led growth strategies have become the main paradigm for developing countries seeking to achieve higher economic growth. While exports are key to generating income, there are concerns regarding limitations in external demand. Specifically, China's remarkable export performance has been at the center of debates that revolve around possible export displacement effects on other countries. This study reviews this literature on export-led growth and crowding-out effects induced by China's growing exports on various countries and regions. Moreover, reflecting dynamic changes in export structure, lists of key products for Chinese exports are provided. While using the 4-digit level Harmonized System (HS) classification, the selection of the products is based on improvements in revealed comparative advantage (RCA) over the period from 2009 to 2018 and is specific to China's top three sectors with the largest global market shares: textile, electronics and machinery. Additionally, lists of competitor, potential competitor and potential loser countries are identified in the markets for these specified key products. The findings demonstrate increased competitive pressures on more advanced countries in connection with the increased sophistication of Chinese exports.

Jel Codes: F14, F15, F62

Keywords: Chinese Economy, Export-Led Growth, Crowding-Out, Export Structure

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Öz

İhracata dayalı büyüme modeli stratejisi ekonomik büyüme oranlarını artırmayı hedefleyen gelişmekte olan ülkeler için temel paradigma haline gelmiştir. Her ne kadar ihracat, gelir yaratmanın anahtarı olarak görülse de dış talebin limitli olabileceğine ilişkin endişeler bulunmaktadır. Spesifik olarak, Çin'in dikkat çekici ihracat performansının diğer ülkelerin ihracatları üzerinde muhtemel yerinden edici etkisi tartışmaların merkezinde yer almaktadır. Bu çalışma, ihracata dayalı büyüme ve Çin'in artan ihracatının çeşitli ülke ve bölgeler üzerindeki dışlama etkisine ilişkin bu literatürü gözden geçirmektedir. Ayrıca, Çin'in ihracat yapısındaki dinamik değişimleri de yansıtan önemli ürünlerin listeleri sunulmuştur. 4 haneli Harmonize Sistem (HS) sınıflandırması kullanılarak oluşturulan ürün seçimi, 2009-2018 yılları arasında Çin'in açıklanmış karşılaştırmalı üstünlüğündeki iyileşmelere ve Çin'in en geniş global pazar payının bulunduğu tekstil, elektronik ve makine sektörlerine dayalıdır. Ek olarak, bu ürünlerin pazarında saptanan mevcut rakip, potansiyel rakip ve potansiyel kaybeden ülkelerin listeleri sunulmuştur. Bulgular, Çin ihracatının artan sofistikleşmesine bağlantılı olarak daha gelişmiş ülkeler üzerinde artan rekabetçi baskıya işaret etmektedir.

Jel Kodları: F14, F15, F62

Anahtar Kelimeler: Çin Ekonomisi, İhracata Dayalı Büyüme, Dışlama Etkisi, İhracat Yapısı



1. Introduction

Export-oriented industrialization (EOI), or the export-led growth strategy has been the main paradigm since the late 1970s with accompanying efforts to integrate more economies into liberalized global trade linkages. The paradigm has become the main prescription for the developing world in its quest to catch up with the developed world. The Asian miracle, with its so-called *flying geese pattern*, and specifically the economic growth of South Korea and Taiwan after World War-II, have been put forward success examples of EOI.

The arguments for defining the exports as the engine for economic growth vary. In mainstream economics, through the implementation of free trade policies, countries can exploit their comparative advantages and achieve higher economic growth. For Post-Keynesian economics (PKE), or more specifically for Kaldorians, export revenues are the driver of economic growth as they help to generate income stemming from external demand (Kaldor, 1970). Nevertheless, the limits to export-led growth are also recognized. On the mainstream side, although not dominant, there has been literature on immiserizing growth caused by deteriorating terms of trade (Bhagwati, 1958). In PKE, there have been studies that recognize the balance of payments constraints and possible crowding-out effects. However, it should be noted that the empirical investigations on crowding-out effects were not limited to studies that are PKE-oriented. Yet, it is the PKE that draws attention to the role of demand in the limitations of export-led growth strategies.

As is induced by intensified export-led growth strategies, the crowding-out effects are considered in connection with what is known as the *fallacy of composition*. The fallacy occurs when the growth in import demand of external markets fails to compensate for the growing export supply. As a result, a country's export share grows at the expense of another. With its large population and rapid economic growth, there has been specific interest in China's integration into the world economy and its impacts on export shares of other developing countries, especially those with similar export structures. While this study points to potential market share losses due to increased competition, this is not to argue an exhaustion of export-led growth strategies, rather to highlight the importance of export structure.

The purpose of this paper is to briefly review the literature on crowding-out effects in connection with the export-led growth paradigm and provide a descriptive analysis on China's recent export trends. Furthermore, based on improvements in revealed comparative advantage (RCA) over the period from 2009-2018, the key products for Chinese exports are identified. However, RCA indices are not considered to indicate the 'presence' or 'absence' of Ricardian comparative advantages; instead, they indicate the presence, success or failure of efforts in gaining competitiveness in this analysis. The selection of products is based on the 4-digit level Harmonized System (HS) classification within the textile, electronics and machinery sectors, in which China's export shares in the world market are the largest. For each specified key products competitor, potential competitor and potential loser countries are also identified based on their RCA trends. A country is listed as a 'competitor' if its RCA is consistently above 1; a 'potential competitor' if its RCA is growing but is not yet above 1 or has become 1 just recently; and a 'potential loser' if its RCA was above 1, but has been steadily declining and now is less than 1.



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The organization of the remainder of this paper is as follows. Section 2 briefly introduces the discussions around export-led growth with a specific focus on Post-Keynesian arguments. Section 3 reviews the literature on crowding-out effects of export-led growth. Section 4 presents a descriptive analysis on China's recent export trends, identifies its key products along with competitor, potential competitor and potential loser countries. Finally, Section 5 concludes.

2. Visions of Export-Led Growth

As is well-known, Ricardo's theory of comparative advantages has been the backbone of the mainstream arguments that support free trade policies. Heckscher-Ohlin (H-O) theory is in continuance with the comparative advantage theory but not based on differences in labor productivities, but on factors of production endowments. Consequently, H-O theory proposes that countries should specialize in sectors according to their factor endowments. In other words, countries with labor abundance should specialize in labor-intensive production sectors, while countries with capital abundance should specialize in capital-intensive production sectors. In the presence of free trade, there are mutual benefits for trade partners. As for the question of how to climb up the ladder, the ability to acquire capital goods cheaply through free trade arrangements is argued to lead labor-abundant country to eventually accumulate capital and upgrade their industry into more capital-intensive sectors. Hence, countries should conform to their comparative advantages (Lin & Chang, 2009).

Although it is debated whether it was a product of deliberate industrial policies or an adaptation of free trade policies, the Asian miracle is proposed to be one of the export-led growth success stories. Reflecting their regional growth pattern, Akamatsu's (1961) flying geese paradigm is argued to be behind such success. In this pattern, relatively developed countries climb up the technological ladder and provide cheap high-tech products while leaving rooms for less developed countries to produce lower technology products. As Kasahara (2004) argues the modern versions of the paradigm highlights the importance of transnational corporations (TNC) in creating dynamic comparative advantages through technology transfers and industrial relocation from first tier newly industrialized economies to following ranks. Nevertheless, the upgrades should not be taken as automatic. First, it is not straightforward for firms how to survive under competitive pressures. Moreover, there are issues with technology transfers through TNC's. Finally, there is a question of whether the first-tier countries provide enough demand for the production of the countries in the following ranks. Therefore, export-led growth strategy that is based on conforming to static comparative advantages does not guarantee that a country can escape from sustained backwardness.

Distinguishing itself from mainstream vision, PKE adopts a demand-led approach to explaining economic growth. In PKE, the exports are key for economic growth as they generate revenues beyond the income created through internal demand management. As Kaldor (1970) argues, there are a variety of advantages to external demand management over internal demand management. First, it induces more investment spending than consumption spending does. This is important because increased investment spending leads to productivity gains without inducing trade deficits, whereas increased consumption spending leads to higher imports.



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Second, revenues from external demand management are directed more toward the manufacturing industry, which is subject to increasing returns.

Aside from the demand-led growth vision of PKE, the path to development is not seen automatic as in the mainstream view. Rather, there is a specific focus on economic structure. Besides the effect of price competitiveness, the demand for exports of a specific good heavily relies on the growth of the rest of the world and on the income elasticity of demand for imports of this good. The income elasticity of demand for imports parameter is key in the determination of the long-run growth rate, as the parameter carries information regarding non-price competitiveness and sectoral composition of a country. The key importance of the parameter is widely discussed in the multi-sectoral balance of payments constrained growth (BPCG) literature (Araujo, 2012; Araujo & Lima, 2007; Gouvea & Lima, 2010).

As the generation of export revenues relies on external demand, there has been growing literature on the question of whether the growth of import demand for products compensates for the growth of export supply within a specific sector. This has become a concern as export-led growth has become the main paradigm for the developing world. It has been argued that increased attempts at producing the same products are subject to the fallacy of composition, in which countries secure larger market shares at the expense of others. In other words, countries with similar export structures are at risk of being crowded-out. The following section reviews this literature on the crowding-out effects of export-led growth paradigm.

3. A Review on Export-Led Growth and Crowding-Out Effects

One of the well-known arguments regarding the consistent backwardness of countries relies on the Prebisch-Singer thesis. According to this thesis, trends in the terms of trade disadvantage the primary products when compared to manufacturing products (Prebisch, 1962). Hence, countries that are stuck in the production of primary goods or low-tech products fall behind in the competition. Consequently, there has been increasing pressure on developing countries while climbing up the ladder. However, producing similar medium or high-tech goods has brought along new obstacles for developing countries in the process of industrial upgrading in this intensifying competitive environment. Kaplinsky (1993) points to a commodification trend for manufactured products due to mass production and the cheapening unit values induced by intensified competition for external markets. Mayer (2002) also points to deteriorating terms of trade trends in less technology-intensive and more labor-intensive manufactured.

Finally, as is the issue of this paper, there have been concerns regarding the demand limitations for growing exports into specific sectors that result in export displacement. According to Blecker (2003), the export-led growth strategy exhausts itself in the presence of the involvement of many countries due to two constraints. The first constraint is the possibility of inducing protectionist policies.² The second is the limited number of importing firms in the markets that are competed for. The demand limitation, as is argued by Razmi & Blecker (2010),

² Please see also an earlier study by Cline (1982) which argues that there exists a "speed limit" for manufacturing exports growth to not trigger protection.

can occur either because industrialized countries do not grow enough or alternatively the income elasticity of demand for developing country exports is not high enough. After the limit for the import demand is exhausted, any new entrants can gain market shares only by reducing the shares of others.

The question of whether there are limits to the export-led growth strategy due to crowding out has been widely explored in empirical literature mainly based on the impacts of China's growing exports. For example, in a study based on the US market over the period 1988-1999, Palley (2000) reports evidence for a significant crowding-out effect. The increase in China's share from 2% to 8.1% is argued to have displaced the export shares of the four tigers (Hong Kong, Singapore, South Korea, and Taiwan). In connection, the author highlights that China has become a big concern for countries with its low production costs and labor abundance.

With its large market, consumption-led growth pattern and large trade deficits, the investigation of the export displacement in the US market is important. Nevertheless, the US market is not the sole demand source for the exports from developing countries. Hence, it is important to extend the scope of the analysis. In such a study, Razmi (2007) investigates exports from developing countries into 13 main importers and reports evidence for crowding-out effects. Dividing the period into two parts as 1984-1994 and 1994-2004, the effect is reported to be stronger for the latter period due to China's intensified export efforts especially in the (standard international trade classification) SITC-7 category (machinery and transport equipment) and its sub-groups. Razmi & Blecker (2008) also find evidence for crowding out, but mainly in low-tech products in their estimations with disaggregated data that is based on SITC categories.

There are also a variety of studies that investigate the impact of China's growing exports on specific regions. For instance, Eichengreen et al. (2007) analyze if China's exports crowd-out other Asian countries over the period between 1990-2002. The effect is found to be limited to consumer goods so far, hence the negative effect is mainly experienced by less developed Asian countries. On the other hand, more developed Asian countries are reported to benefit from China's increasing imports of machinery and equipment. In contrast, Greenaway et al. (2008) report that the observed displacement effect is more prominent for the higher income Asian exporters. Furthermore, it is reported that the benefits from increased China's imports do not compensate for the negative displacement effects. As China has shown export patterns that shift towards more sophisticated goods, Pham et al. (2017) explore if China's exports have displaced its competitors specifically in key high-tech sectors (chemistry, computer-office machines, electrical and non-electrical machinery, electronics-telecommunications, pharmacy and scientific instruments) spanning the period 1992-2013. Their findings show that China's exports have displaced exports from developing countries such as India, Brazil, Mexico, and Thailand, while complementing the high-tech good exports from developed economies such as Organization for Economic Cooperation and Development (OECD) countries, Japan, and South Korea. In a recent study based on Brazil, Cunha et al. (2023) also report evidence for the negative effect of Chinese competitiveness on Brazil's market share in manufactured goods for the period between 2001-2009. In a study based on the effects of China's competitiveness on African countries, Giovannetti & Sanfilippo (2009) find evidence for displacement specifically in machinery and equipment sectors over the period 1995-2005. In addition,

Edwards & Jenkins (2014) study the impact of China's export competitiveness on South African exports in Sub-Saharan African (SSA) markets, reporting evidence for relative negative effects on South African exports to SSA.

Nevertheless, it should be noted that not all studies find evidence for crowding-out effects caused by China's integration into the world economy. For instance, Athukorala (2009) argues that the rise of China has not led to market share losses for exports from East Asian countries, or the other regions over the period 1992-2005, although there have been dampening effects depending on specific sectors. Furthermore, through disaggregating the exported products into final goods and parts or components, the author argues that China seems to be a center for assembly for the components which it imports. In consequence, evidence indicates complementarity rather than crowding out. In their gravity model, Kong & Kneller (2016) also report evidence for export complementarity rather than displacement for the effects of China's exports on other Asian countries over the period between 1994-2008.

The investigation of the effects of China's growing exports on specific regions or countries is not limited to the above studies which use various econometric techniques. Various studies analyze the export structure similarities and market share changes to study the potential displacement effects. In such a study, Lall & Albaladejo (2004) analyze the potential threat of China's integration into the world economy for different East Asian countries in the 1990s. Disaggregating products into resource-based, low-tech, medium-tech or high-tech categories, the authors report that China still heavily dominates the markets for low-tech products, although has been shifting towards production of more complex products. In line with this, the largest market share losses have occurred in low-tech products specifically in the market shares of the four tigers. On the other hand, the new tigers (Malaysia, Thailand, Indonesia, and Philippines) have enjoyed low market share gains. Similarly, Kaplinsky et al. (2007) argue that China has considerably displaced the shares of SSA countries in their key sectors such as clothing, furniture, and footwear manufacturing sectors. The displacement has had devastating consequences for the region due to large employment losses.

In another study, Lall et al. (2005) analyze the impact on Latin American and Caribbean (LAC) countries for the period between 1990 and 2002. Using disaggregated data based on resource-based, low-tech, medium-tech and high-tech categories and their sub-categories along with the product sophistication index,³ the authors argue that many small LAC countries are not under direct threat of China's integration. This is because these countries mainly specialize in primary products. Nevertheless, countries that have similar structures such as Chile, El Salvador and Costa Rica are the most affected countries, and Mexico is under the greatest potential threat due to decreases in transportation costs. As for Brazil, Jenkins & Barbosa (2012) point out export share losses in a variety of markets specifically after China's World Trade Organization (WTO) accession. The authors take notice of primarization of Brazil's export structure in which the share of the primary goods has been significantly rising with a shrinking share of manufactured goods in total exports.

Similarly, Memis & Ozay (2019) also investigate the changes in the export structures in the East and Southeast Asian region and question if the changing patterns can account for a flying

³ Please see Lall et al. (2006) for the rationale and methodology of the sophistication index.

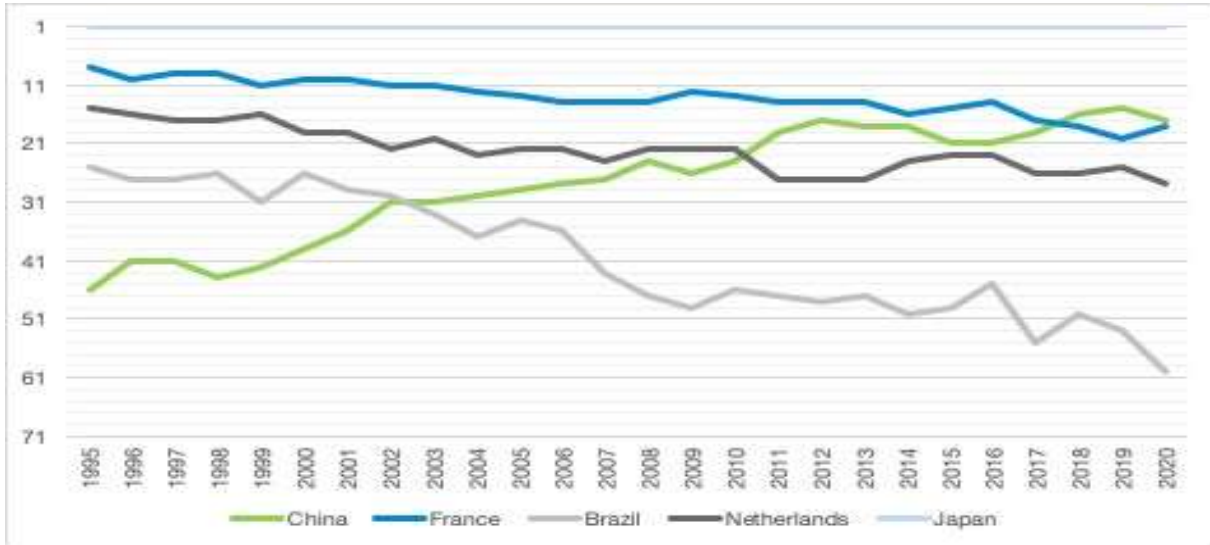
geese pattern. The analysis is based on product sophistication indices adopted from Kwan (2002) with modifications, which in turn is used to calculate country sophistication indices. Based on these indices, it is reported that China is only very slowly moving away from producing low-sophisticated products, which create challenges for countries with similar export structures. Nevertheless, the authors argue the overall impact of China's relation with the region should also take into account the immense growth of FDI outflows from China, of which the benefits might outweigh the negative impacts of the competitiveness in exports.

As has been demonstrated in this section, the literature on crowding-out and displacement effects caused by China's growing export shares in the world market is rich. Although there are studies which indicate complementarities, the majority of studies find evidence for displacements in the exports of different sets of commodities for different countries with varying degrees. Although not immediate, export structure is subject to changes dynamically not only due to deliberate industrial policies but also due to internal social conflicts, trade agreements, recessions and conditions in the supply chains. In consequence, China's export structure has also undergone important changes in recent years. These changes lead to while new potential complementarities or displacements. As the purpose of this study is to capture the recent trends in China's export structure along with its growing competitive pressure, the next section aims to identify these key products along with lists of competitor, potential competitor, and potential loser countries in these markets.

4. China's Export Trends

China has exhibited unprecedented economic growth and export performance in recent decades. The purpose of this section is not to provide a detailed outline or history of this performance; rather, is to highlight very recent trends in its exports structure that indicate dynamic changes in China's economy. As widely argued, China's dual economy character, along with its large population and low labor costs, have been significant factors behind the country's outstanding performance. Nevertheless, there are studies that argue the experience of the 'Lewis turning point' in China, indicating the completion of the demographic transition from rural to urban areas (Cai, 2010). Furthermore, it is well-reported that wages have been rising (Cui et al., 2018), and China's export structure has been shifting away from being heavily labor-intensive and becoming more diversified and sophisticated (Jarreau & Poncet, 2012). For instance, China is reported to have added 28 new products, many of which are high complexity in various sectors since 2005. The country now is ranked first worldwide in terms of diversity. Furthermore, as is seen from Figure 1 below, China's export complexity index has been rising rapidly. The rise is visible in in country's ranking, which improved from 46 to 17 in the world over the period 1995-2020 (The Atlas of Economic Complexity, 2023).

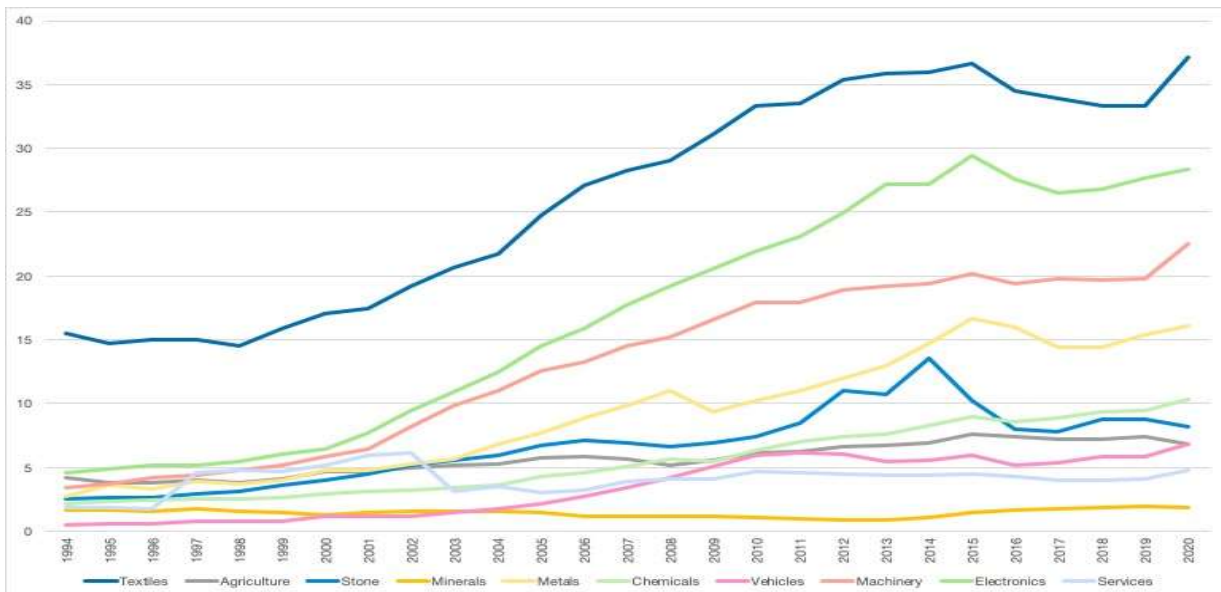
Figure 1: Export Complexity Rankings



Source: The Atlas of Economic Complexity, The Growth Lab at Harvard University.⁴

In connection with this increased complexity, China's export structure has been undergoing changes in terms of its sectoral shares in the world market. Although the textile sector still constitutes the largest share with its consistent growth, the shares of the electronics and machinery sectors have also been growing rapidly as is seen in Figure 2 below. According to data, China's global market share for electronics is 28.32% while it is 22.5% for the machinery sector as of 2020 (The Atlas of Economic Complexity, 2023). Reaching such high global export shares is also indicative of China's industrial shift towards more productive sectors.

Figure 2: China's Global Market Shares by Sector



Source: The Atlas of Economic Complexity, The Growth Lab at Harvard University.⁵

⁴ Retrieved July 15, 2023, from <https://atlas.cid.harvard.edu>.

⁵ Retrieved July 15, 2023, from <https://atlas.cid.harvard.edu>.

Given their large global market shares, we delve deeper into China's textile, electronics and machinery sectors using the 4-digit level disaggregated HS classification. The objective is to present key products in which China has been gaining significant market power. Additionally, we compile lists of competitor, potential competitor and potential competition loser countries in order to understand the competitive dynamics in the markets for these products. The following subsections outline the methodology and present the findings regarding the selection of key products and competitors for Chinese exports.

4.1. Methodology

China's accession to the WTO in 2001 is one of the most significant events that have raised the concerns regarding China's crowding-out effects on other countries, particularly developing countries specializing in more labor-intensive goods in their exports. The literature on export displacement effects that occur during this period is extensive. The purpose of this section, however, is to reflect recent changes in Chinese exports. Hence, the selection of the key products is based on the growth in RCA in recent ten years.⁶ Although the data is available up to 2020, the last two years are omitted due to worldwide supply and demand shocks induced by the Covid-19 pandemic. Hence, we analyze the period from 2009 to 2018.

As is known, RCA is calculated as follows:

$$RCA_{ikt} = \frac{X_{ikt} / \sum_{p \in K} X_{ipt}}{\sum_{j \in J} X_{jkt} / \sum_{j \in J} \sum_{p \in K} X_{jpt}}$$

where J and K are sets of countries and products; i, k and t represent country, product and period respectively. Hence, RCA is the ratio between the share of the product in a country's total exports and the share of the product in total world exports. A country is assumed to have revealed its comparative advantages in a specific product when $RCA > 1$ (Balassa, 1965). However, we should note that the reason for making an analysis based on RCA is not to conform with the theory of comparative advantages. RCA trends in this analysis are not taken as indicators of the 'presence' or 'absence' of comparative advantages; rather, they are used to assess the presence, success or failure of efforts in gaining competitiveness.

The list of products in which China has $RCA > 1$ is extensive. To capture the dynamic changes in Chinese exports, we use the growth in RCA to select key products. To better reflect China's increased efforts in gaining greater market power, we look for consistency in RCA growth over the period from 2009 to 2018 to avoid capturing transient changes in RCA due to disruptions in the market for specific goods that might occur in some years. Furthermore, if there exists persistent and high growth in RCA for a specific good compared to other goods over the subject period, the product is still listed as 'key' even if its RCA has not exceeded 1. This is because persistent improvement in RCA is considered an indicator of high efforts to capture market shares whether or not China has 'revealed' its comparative advantages. In addition, the inclusion of products in which China has high RCA growth (even if the RCA has not exceeded one yet) allow us to capture products with low but steadily growing volume in

⁶ Please see The Growth Lab at Harvard University (2019) for the data set.

China's production, which could be crucial for other countries due to their small size or heavy reliance on these products.

An increased share of a product in China's export compared to the share of the same product in world exports can signal potential crowding-out effects for other countries. Therefore, we identify countries facing competitive pressure from Chinese exports in the markets for the identified key products. In the tables below for the key products, we provide columns for 'high RCA', 'rising RCA' and 'lost RCA' columns, corresponding to competitor, potential competitor and potential loser countries, respectively. Competitors are chosen based on persistently having an $RCA > 1$ over the subject period, 2009-2018. In other words, these are the countries which have manifested their competitiveness in exporting the specified good. A country is listed as a potential competitor if its RCA has been persistently growing, even though the ratio has not yet exceeded 1. In other words, the country has sustained efforts in gaining market power although it has not yet revealed its competitiveness. This is the reason why the country is considered a *potential* competitor. However, the country is still listed under this category if the RCA has exceeded 1 within the last three years of the subject period, as the 'reveal' might be only transitory. Finally, countries are listed under 'lost RCA' if they had a high (>1) and persistent (at least for 5 consecutive years) RCA over the period but has later become persistently low (<1).

4.2. China's Exports: Key Products and Competitors

Based on the selection criteria above, the key products in the textile sector in which China had high and consistent RCA growth are found under the chapters of man-made filaments and man-made staple fibers. These products are as follows: artificial monofilament (HS-5405), man-made filament yarn for sale (HS-5406), woven fabrics of artificial filament yarn (HS-5408), artificial filament tow (HS-5502), and artificial staple fibers (HS-5504). Among these five products, artificial monofilament, artificial filament tow and artificial staple fiber are ranked high in the product complexity list (The Growth Lab at Harvard University, 2019). For these products, the list of competitor, potential competitor and potential loser countries are listed in Table 1 below.

Table 1: Key Products in the Textile Sector

| Product | High RCA | Rising RCA | Lost RCA |
|---|--|---|---|
| 5405 – Artificial monofilament | Egypt, Italy, Japan, Taiwan, United Arab Emirates | Iran, Portugal, Singapore, South Korea, Thailand, Turkiye | Belarus, Brazil, India, Poland, Romania, Sri Lanka, the US |
| 5406 – Synthetic Filament Yarn for Sale | Belarus, Egypt, Italy, Mexico, Paraguay, Taiwan Tunisia, Turkiye | Benin, Iran, Japan, Netherlands | Croatia, India, Indonesia, Myanmar, Nepal, Panama, Philippines, Senegal, Thailand, the US |
| 5408 – Woven fabric of artificial filament yarn | Bulgaria, Spain, Gambia, Hong Kong, India, Italy, Japan, Lithuania, Portugal, South Korea, Turkiye | Fiji, Lebanon, Madagascar, Senegal | Austria, Belarus, Czechia, Croatia, Egypt, Ethiopia, Germany, Indonesia, Moldova, Sri Lanka, Slovakia, Taiwan |
| 5502 - Artificial filament tow | Belgium, Brazil, Germany, Japan, Netherlands, Singapore, South Korea, the US | Kenya, Malaysia, Russia, Zimbabwe | Canada, Mexico, the UK, Venezuela |
| 5504 – Artificial staple fiber | Austria, India, Indonesia, Sri Lanka, Taiwan, Thailand, the UK | Croatia | Brazil, Finland, Germany, Spain, Russia |

For the electronics sector, the identified key products are under the 'electrical machinery, and equipment and parts thereof' chapter according to the HS classification. The specific products, along with the lists of competitor, potential competitor, and potential loser countries are presented in Table 2 below. While industrial laboratory electric furnaces and ovens is ranked the highest (15th), all the products listed below are categorized as highly complex among the entire range of 4-digit level HS products as of 2020 (The Atlas of Economic Complexity, 2023).

Table 2: Key Products in the Electronics Sector

| Product | High RCA | Rising RCA | Lost RCA |
|---|--|---|--|
| 8503 - Parts suitable for use solely or principally with electric motors and generators | Albania, Austria, Bosnia and Herzegovina, Croatia, Czechia, Denmark, Estonia, Finland, Germany, Hungary, Italy, Japan, Lebanon, Mexico, Poland, Romania, Serbia, Slovakia, Slovenia, Spain, Switzerland, Tunisia | India, Lithuania, Portugal, Suriname, Türkiye | Singapore, Taiwan, Thailand, the US |
| 8514 - Industrial or laboratory electric furnaces and ovens | Austria, Czechia, Germany, India, Italy, Japan, Poland, Sweden, Switzerland, Taiwan, the UK, the US | Estonia, Finland, Lebanon, Lithuania, South Korea, Spain | Bosnia and Herzegovina, Netherlands, Philippines, Romania |
| 8520 – Magnetic tape recorders or other sound recording apparatus | Hong Kong, Malaysia, Panama, Philippines, The UK | Austria, Belgium, Germany, Slovakia, Vietnam | Hungary, Israel, Japan, Singapore, South Korea, Taiwan, United Arab Emirates |
| 8530 – Electrical signaling, safety or control equipment | Australia, Austria, Belgium, Belarus, Canada, Croatia, Czechia, Denmark, Estonia, Finland, France, Germany, Italy, Mexico, Slovenia, Spain, Sweden, the US, the UK | Bulgaria, Latvia, Lithuania, Morocco, Netherlands, Portugal, Serbia Thailand | Romania, Switzerland, Ukraine |
| 8535 – Electrical apparatus for switching or protecting electrical circuits | Croatia, Dominican Republic, Estonia, France, Germany, Hungary, Indonesia, Italy, Mexico, New Zealand, Sweden, Switzerland, Tunisia, Türkiye, the US | Andorra, Austria, Bulgaria, Cyprus, Dominica, Finland, Lesotho, Poland, South Korea, Thailand, Uzbekistan | Armenia, Malaysia, Singapore, Slovakia, Ukraine |
| 8543 - Electrical machines and apparatus, having individual functions | Germany, Hong Kong, Israel, Japan, Mexico, Malaysia, Philippines, Singapore, Thailand, the US, the UK | Hungary, Slovenia, South Korea | Latvia, Malta, Switzerland |
| 8545 – Carbon electrodes and brushes | Austria, France, India, Japan, Lithuania, Netherlands, Norway, Poland, Russia, Spain, Ukraine | Hungary, Iceland, Malaysia | Albania, Germany, Italy, Mexico, Romania, the US |

Finally, the list of key products in the machinery sector falls under the chapter of 'nuclear reactors, boilers, machinery and mechanical appliances; parts thereof', with the exception of one product, which is under the 'optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof' chapter. Table-3 below provides the products, along with their HS codes, and the list of countries that are competitors, potential competitors, and potential losers. Similar to the key products listed in the electronics sector, the products listed below are also listed as highly complex, with nuclear reactors (HS-8401) ranking the highest at 9th as of 2020 (The Atlas of Economic Complexity, 2023).

Table 3: Key Products in the Machinery Sector

| Product | High RCA | Rising RCA | Lost RCA |
|--|--|---|-------------------------|
| 8401 – Nuclear reactors | France, Germany, Spain, Russia, Sweden | Croatia, South Korea, the US, Ukraine | Belgium, Netherlands |
| 8446 - Looms | Austria, Belgium, Germany, Italy, Japan, Pakistan, Swaziland, Switzerland | India | South Korea |
| 8449 – Machinery to manufacture felt | Austria, France, Germany, Italy, Portugal | | Czechia, Norway, Taiwan |
| 8456 – Machine tools for working materials by laser or similar means | Germany, Italy, Japan, Singapore, South Korea, Switzerland, Taiwan, Thailand | Austria, Israel, Luxembourg, Slovakia, Slovenia, Spain, Türkiye | Swaziland, the US |
| 9007 – Cinematographic cameras and projectors | Austria, Belgium, Canada, Costa Rica, Germany, Hong Kong, Jordan, Lebanon, Malaysia, Netherlands, New Zealand, Panama, Singapore, the US, the UK | Estonia, Fiji, Philippines, Romania, Sweden, Türkiye, | France, Italy, Kenya |

As argued before, the increased global market shares of the electronics and machinery sectors are indicative of China’s economic transformation. Although the lists of products presented above are only limited, they also demonstrate how China’s economic structure relies increasingly on complex products at the disaggregated level, including the textile sector. The shift toward more sophisticated goods is visible not only in the product complexity indices, but also in the reported lists of competitor countries with ‘high RCA’, most of which are not developing countries. However, it should be noted that competitor, potential competitor, and potential loser countries can vary significantly depending on the specific product. Also, countries’ RCA losses might be not directly induced by China’s RCA improvements in these products. More importantly, an RCA loss in a specific sector holds varying significance for countries depending on its weight in the economy. All of this is to say that an investigation of China’s impact on countries or regions’ exports is not straightforward, but rather a complex task. As Stevens & Kennan (2006) argue, the task requires not only identifying the key products where China has growing exports, but also investigating how significant these products are for the competing, specifically for the developing countries.

5. Concluding Remarks

Exports play a crucial role in economic growth as they generate income through external demand. However, the intensified adoption of EOI strategies has raised concerns regarding the limits of this external demand. In other words, the ability of demand growth to compensate for the growth in the supply of specific products is under discussion. Many of these discussions have centered around China, given its remarkable export performance and economic size. This study reviews both the theoretical arguments for the potential limitations of export-led growth strategies and the empirical literature that has developed on China’s crowding-out effects on other regions and countries. Many of the studies presented in this paper investigate these impacts for periods that are not very recent, while China’s economic structure has undergone dynamic changes. For instance, there are arguments for the possibility of the



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exhaustion of dual economy characteristics and evidence of increases in real wages in China, indicating a loss of labor cost advantages. Consequently, China's export structure increasingly relies on more sophisticated goods.

To reflect these dynamic changes, this paper identifies key products in China's exports in the textile, electronics and machinery sectors. These sectors are chosen as they are the top three sectors in which China has the largest global market share. Within these sectors, the key products are identified on the basis of RCA growth within the period from 2009 to 2018. China's efforts to gain market shares in new products create new opportunities and challenges for countries which compete in the markets for these products. Hence, lists of existing competitor, potential competitor, and potential loser countries in the market of the identified products are also presented. It is important to examine specific sectors where China has been specializing, along with identifying the competitors, since a country's export structure might heavily rely on these specific products.

Investigation of the products with the 4-digit level HS classification within these three sectors demonstrates that China's RCA improvements have been mostly observed in the goods with high PCI. Hence, the analysis presented in this paper indicates that China's exports have become more sophisticated over the recent years. Consequently, while China might still pose a threat to less developed countries, it has been creating increased competitive pressures for more developed countries. Nevertheless, this is not to claim the impossibility of achieving higher economic growth for a country through the implementation of export-led growth strategies. Rather, we argue against assuming an automatic and straightforward path from EOI strategy to high economic growth. In other words, it is important to pursue deliberate industrial policies that aim not only to improve export sophistication but also to achieve greater export diversification in order to sustain high economic growth. Moving the industrial structure towards more productive sectors is important for growth, and for moving away from a 'race to the bottom' where labor conditions deteriorate due to efforts to gain labor cost advantages. However, export diversification is also crucial for reducing reliance on specific sectors to improve the ability to adapt to changes in market shares due to intensified competition.

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