A new and benign hegemon on the horizon?
The Chinese century and growth in the Global South

Tam NguyenHuu and Deniz Dilan Karaman Örsal

Abstract

The authors investigate how the Global South's gross domestic product (GDP) is impacted by trade with China. While the current literature on the growth impacts of trade (by leading partner countries) often neglects the properties of macro panel data, such as cross-sectional dependence, heterogeneity and structural breaks, their models take these features into account. Their empirical results based on 22 major developing countries from 2000Q1 to 2016Q4 identify positive contributions of imports from China to GDP in the studied sample, although these effects are smaller compared to imports from other emerging and developing economies (excluding China) (EME) and advanced economies (AdE). The authors also show that, in contrast with considerable impacts of exports to EME and AdE, exports to China have limited effects on the growth of its partners. However, the global financial crisis marks a turning point of China's role as a major driver of growth in the South. Namely, while the positive growth effects of trade with China after the global crisis are on the rise, the opposite is true for EME and AdE. Examining the effects by individual countries, the authors present that the distance between China and its partners, economic and institutional development levels of its partners are almost irrelevant to the contributions of imports from China to its partners' growth. Based on these findings they provide some important policy recommendations for the economies of the Global South.

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Authors
Tam NguyenHuu, ✉ Leuphana University Lüneburg, Lüneburg, Germany, nguyen@leuphana.de
Deniz Dilan Karaman Örsal, University of Hamburg, Hamburg, Germany, and Leuphana University of Lüneburg, Lüneburg, Germany, deniz.oersal@uni-hamburg.de

A new hegemon. The Chinese century is well under way.
Many trends that appear global are in fact mostly Chinese.

The Economist (2018)

Covid-19 is teaching hard lessons about China-only supply chains.
At the very least, an emotional decoupling is under way.

The Economist (2020)

1   Introduction

The dramatic rise of China in international stage and the gradual fall of traditional powers in recent decades have had important economic implications for the developing world. China's recent prominence in the world is more comprehensive than that of Japan after the World War II, four Asian Tigers in the later periods, and recent large emerging economies like India and Brazil. The Chinese economy has broader effects because of its huge size (Haltmaier et al. 2007), and rigorous growth speed in both output and trade (Shafaeddin 2010; The Economist 2018).

Among the economic linkages between countries, such as investment, technology, migration, remittance, or economic agreements, trade is the most important one (Dahi and Demir 2017). Surpassing some Western countries to be a major trade partner in many developing regions, a rising China brings not only valuable opportunities but also challenges for economic growth in the South. Over the last decade, China has become a new destination for raw materials and intermediate goods from developing countries. In addition to this, China is able to provide cheaper inputs for production and cheaper goods for consumption in its partners. However, Chinese goods might intensify competition pressure for local producers.

Two telling examples of the increasingly prominent role of China in the global economy are the recent trade war between the United States (US) and China, and the outbreak of Covid-19 epidemic in China spreading to many parts of the world. Both "Chinese" events have caused huge impacts on the global economy. The world growth rate in 2019, the lowest level since 2009, is attributable to the US's trade war with China. International Monetary Fund forecasts that the ongoing spread of the Coronavirus disease, which is the greatest danger for the global output since 2009, could lead to even bigger drops in the global growth "under any scenario" (Georgieva 2020). On the supply side, impacts of China on the global production can be seen firstly through its core position in the global business supply chains. On the demand side, China's huge population with GDP per capita (current US$) of almost 10,000 in 2018 and still in strong upward trend is driving the globe, especially developing economies.

Understanding to what extent China might affect the emerging economies is of paramount importance for policy makers and researchers. This helps to anticipate the consequences of further shocks originating from China on the Global South, thereby making the necessary adjustments. As an example, at the beginning of the Coronavirus outbreak in China, many of the global companies that are heavily dependent on China mainland started to think of revising their

production activities and policies. Motivated by this, our paper aims to quantify the contributions of trade with China compared to trade with other country groups to economic output in the developing world during 2000–2016. This would provide a comprehensive assessment on how influential China is at the national level.

Our paper contributes to the literature on the benefits of trade by destination for the Global South with a strong focus on China. First, we focus on growth impacts of trade according to destination (so-called growth-by-destination, as in Baliamoune-Lutz (2011), Mullings and Mahabir (2018), for more clarity, we call it "growth-by-(trade) destination"), namely, trade with China, EME and AdE. Due to particular features of China's rise and its economic significance, we expect trade with China to have specific impacts on growth compared to trade with other partners. Research on the emergence of China has attracted some recent attention, but a comparative and comprehensive exploration is still rare.

Second, in terms of methodology, we apply Common Correlated Effects (CCE) estimation method, which is appropriate for large heterogeneous panel data. This estimation method has been used barely in growth-by-(trade) destination literature, because only annual data has been available at that time, which made the application of CCE difficult. In contrast to the previous studies, in this study we use quarterly data for the analysis. Furthermore, previous literature applies fixed effects or generalized method of moments (GMM) estimators, which are not robust to heterogeneity, cross-sectional dependence, non-stationarity and structural break. It should be noted that the typical features (heterogeneity, cross-sectional dependence, non-stationarity and structural break) are very common, if not always, in macro panels. Therefore, some of these studies on the same topic, which ignore these features, might lead to wrong statistical inferences. For comparison, we also report a robustness check based on an annual panel dataset.

There are three other contributions of this paper. We investigate the changing role of trade by partners, especially China, on output over the Great Recession in 2008. We investigate whether the severe recession, which originated in the West and affected the West most, strengthened the position of China in the global economy. Furthermore, our analysis covers as many major developing economies as possible. This could provide a more comprehensive view on the impacts of rising China on the Global South. Finally, we examine the role of geographical location, economic and institutional development levels of the partner countries in taking advantages of imports from China. This would help to understand why some countries benefit more from trading with China, while others not.

Our paper consists of five sections. Following this section, Section 2 reviews the relevant literature. Section 3 and Section 4 present our model specifications, outcomes of the tests and estimation results. Finally, Section 5 concludes.

2 Trade and growth literature: A growth-by-(trade) destination perspective

This part reviews the theoretical and empirical literature on the role of trade volume and trade partners on GDP in the developing world. First, regarding trade volume, similar with traditional

major trade partners, the emergence of China might contribute to higher trade openness in the developing countries, which is crucial to economic growth. Second, while the major trade partners in the world like the US and European countries are the advanced economies, China is almost characterized by the modest level of technology, high demand for raw materials and massive production of cheap manufactured goods. These characteristics might have different implications for the production in the Global South.

2.1 Export-led growth

Exports make up one of five main components of GDP (the remaining are consumption, investment, government expenditure and import). According to the measurement of GDP, higher exports directly lead to a higher aggregate output level. In addition to this, exports might contribute to economic growth through indirect channels (Awokuse 2005). First, exports can contribute to economies of scale for domestic production, enhancing the competitiveness of firms and productivity. Second, earnings from exports are a source of re-investment and government budget, which might help stimulate output growth. Third, exports promote specialization and efficient resource allocation. Fourth, exports accelerate the technological progress, innovation, and knowledge diffusion and transfer through integration deeper into international production chains (Feder 1982; for a short review: Awokuse 2005; 2008).

Empirical studies show inconsistent evidence of positive effects of exports on economic growth. Awokuse (2006) uses Japanese time series data and shows that exports promote economic growth in this country. Applying Granger-causality tests, Bajo-Rubio and Díaz-Roldán (2012) show the empirical evidence that exports drive economic growth in Czech Republic, but not in eight other new EU members. Using annual data for Chile, Siliverstovs and Herzer (2006) identify a Granger causal relationship from total export to the net-of-exports GDP, while finding no Granger causality from primary export. On the contrary, some evidence demonstrates that the positive effects of exports on growth are conditional. Abu-Qarn and Abu-Bader (2004), using a sample of nine Middle Eastern and North African countries, conclude that the export-led growth hypothesis is only valid when shares of manufactured exports is beyond a certain threshold. In a similar pattern, Riezman et al. (1996) show that the export-led growth hypothesis is proven in some countries only with a certain level of human capital, investment growth and import growth.

2.2 Import-led growth

Following the GDP expenditure-based measurement formula, imports are negatively associated with GDP. Imports are actually accounted as one of the components of expenditure-based GDP like consumption, investment or government spending (Bureau of Economic Analysis 2015). However, imports can have positive impacts on output growth through various channels. Similar to exports, imports promote the transfer of technology and knowledge within the global production networks. Moreover, imports might encourage more competitiveness in the domestic

market, inducing local producers to innovate. Additionally, imports might provide inputs for domestic production and for exports (Lawrence and Weinstein 2001; Awokuse 2008).

Empirical studies present conclusive evidence on the import-led growth argument. Using data of only three countries, namely, Argentina, Colombia and Peru, Awokuse (2008) shows the evidence on significant contributions of both exports and imports to growth, although import-led growth argument has stronger support. Using annual data from 1964 to 2004, Herrerias and Orts (2010; 2011; 2013) indicate that imports are an engine of growth in China mainly by allowing it to access new technology. Based on a panel data from 1970 to 1990 of developing countries, Mazumdar (2001) finds out that imported machinery promotes growth, while investment in domestically produced machinery undermines output growth. Lee (1995) presents a theoretical model in which higher share of foreign capital goods compared to domestic capital goods leads to higher growth, and by using cross-country data from 1960 to 1985, provides empirical support for his theory.

Some studies indicate that imports are even more important than exports in stimulating productivity growth. Thangavelu and Rajaguru (2004) conclude that exports have insignificant effects on productivity growth in Hong Kong, Indonesia, Japan, Taiwan and Thailand, while the import-led growth hypothesis is supported in India, Indonesia, Malaysia, Philippines, Singapore and Taiwan. Their findings also indicate that in the long-run imports outperform exports in terms of contributions to growth. Lawrence and Weinstein (2001) prove that imports are an important source of productivity growth in Japan, as they encourage innovation in the country by pushing domestic producers to compete and learn from foreign rivals.

2.3   Growth-by-(trade) destination: Theoretical and empirical review

Growth-by-(trade) destination theories mainly concentrate on the consequences of South-South versus North-South trade integration. The underlying mechanism is that economic growth is strongly driven by technological diffusion through trade integration (Camerona et al. 2005; Santacreu 2015), thus the development level of trade partner affects technology absorption capacity, productivity, and finally growth of the domestic economy.

Ricardian trade model, a cornerstone of international trade theories, explains the trade relationship among countries based on their comparative advantages, such as natural resources. As an extension of the Ricardian approach, Heckscher–Ohlin framework focuses on factor endowment as driving forces of goods and services exchanges between nations. This theory assumes the same level of technology and tastes in all countries. According to the Ricardian theory, Heckscher–Ohlin approach and their synthesis (Batra and Casas 1976; Deardorff 1987), countries in the North are more capital-intensive while those in the South more labour-intensive. Therefore, when the Northern countries export advanced industrial products to and import raw materials or labour-intensive products from the Southern ones, this would improve welfare of both sides. The emergence of China and its increasing presence in many developing countries might cause harm to consumers and producers in these regions because their consumers must buy lower quality products while their producers must face more fierce competition.

Also, being in favour of North-South rather than South-South exchanges, the new trade theory proposed by Krugman (1979, 1980, 1991) offers new insights on benefits of trade

between countries of different development levels with technology transfer as a major channel. The new trade theory incorporates more realistic assumptions into trade model such as monopolistic competition and increasing returns to scale in an effort to explain large trade among countries with similar productivity and factor endowment. Applying this framework to explain trade directions, developing countries would benefit more from the North-South tie than from China-South relations, because the large gap of technological development between North and South might result in higher technology spill-overs. In trading with the North, Southern countries might have chance to access more varieties of technology, accelerating their adoption process.

However, over the last decades, there is numerous empirical evidence in strong opposition to the North-South integration, thereby in favour of the South-South economic exchanges. Findlay (1980)'s dynamic model and Lewis (1980)'s observations show that growth in the South becomes heavily dependent on the Northern economies through trade linkages. Thus, the decoupling of the South from the North and deeper integration within the Southern region might contribute to more economic stability. In his hypothesis, Linder (1961) states that countries might trade more with those having similar income per capita, because they might consume products with similar quality. From similar demand structure, we might argue that two countries with similar technological levels will strengthen technology spill-overs, because the importers might find it easier to adapt and deploy the technology. This can be extended to consumers' tastes, preferences and habits. Therefore, economic relations with China would lead to more desirable outcomes in developing countries than with the economic relations with Western countries. This might be mainly due to the similarities in technology, and consumer preferences in China and other developing countries (Linder 1961; Bastos et al. 2018). Another reflection of the higher benefits of China-developing countries trade linkages over those of North-developing countries is the imbalances in the North-South trade agreements that favour the Northern partners over developing countries. More specifically, developing countries have smaller resources and less bargaining powers in economic negotiations, arrangements and disputes with the Northern partners (Dahi and Demir 2016). Therefore, China and other emerging economies provide an alternative for the developing countries in terms of reducing uneven benefits from trade, investment, and increase their economic power and policy space in managing their economies. Similar motivations for the increasing investment and trade relations among emerging economies, with China as a typical example, can be seen in a review by Carril-Caccia and Milgram-Baleix (2018).

Considering the relatively recent geopolitical and economic prominence of China at the global scale, there is a limited number of studies working exclusively on China's role in growth in the Global South. Haltmaier et al. (2007) show evidence for the importance of China as an independent source of growth in its neighbouring East and Southeast Asian countries. In another study, Shafaeddin (2010) indicates that China's trade supplements newly industrialized economies while competing with low-income ones. He also observes that China can promote growth in the region through enhancing intra-industry trade specialization (production sharing). Specifically, after Japan, China is a leading importer of parts and components (mostly electrics and electronics) and the biggest exporter of finished goods. This makes China an export hub of Asia and a major contributor to growth of its partners. However, Shafaeddin (2010) also points

out some short and medium-run risks (related to business cycles in China and in developed economies, the correlation of business cycles among economies, and the exchange rate system in China) that the developing world might face when they are a part of the production sharing system with China as a hub. Long-run risks challenging the Global South are the substitution of domestically-produced goods and the transformation towards a consumption-led growth route in China, resulting in a decrease of China's imports from these partners (Shafaeddin 2010).

There is only limited empirical evidence for the impacts of trade by leading partners on the economic growth in the developing countries. Mullings and Mahabir (2018) indicate that trade openness with China is an important driver of economic growth in Africa, especially in landlocked countries and/or with rich resources. However, their findings are not robust in models accounting for endogeneity. Trade openness with the US, European Union and the rest of the world shows insignificant, even negative effects on economic growth in the region. The aforementioned study uses total trade openness rather than exports and imports separately, which definitely have different, even contradictory, effects on growth. Ribeiro et al. (2016) indicate that the expansion of the portfolio of export partners, mostly to less developed and remote regions, might have negative impacts on growth. However, this research uses a constrained sample of only developed economies (European Union members). Busse et al. (2016) find that exports to China have trivial effects, while imports from China have negative effects on growth in Africa. In contrast, in their study, exports to the rest of the world have positive effects on economic growth in Africa only when a fixed effects model is used. Kummer-Noormamode (2014) compares impacts of trade openness with China and trade openness with European Union, the US and the rest of the world on economic growth in 37 African countries from 1985 to 2012. This study demonstrates that trade integration with China or the rest of the world leads to higher economic growth, but only for the period from 2000 to 2012, while trade with industrialized economies has inconsistent results on the economic growth in these African countries.

Another strand of literature uses Vector Autoregressive (VAR) models to investigate the impacts of trade with China on its Asian neighbours. Haltmaier et al. (2007) use quarterly data from 1993 to 2006 to examine the significance of Chinese and the US demand on GDP growth in Indonesia, Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. Their findings show that the impacts of China's demand shocks on GDP growth fluctuations in these countries are as important as those of the US in Korea, Singapore, Taiwan, and Thailand, but not in Indonesia, Malaysia, and the Philippines. Their findings show that China acts at the same time as the engine, conduit and steamroller of growth for Asian countries in the sample. In a similar pattern, Park and Shin (2011) use quarterly data from 1990 to 2009 in a structural VAR model of three-variables (domestic real GDP, the country's real exports to the US, and the country's real exports to China) for each country. They show that exports to China work as an engine of growth in the major East and Southeast Asian economies and the contributions are stronger during both Asian and global crises. However, these findings are not robust when their VAR models are modified by incorporating an extra variable to control the re-exports of goods from the sample countries to the US.

By using fixed effects,[1] first differences and GMM estimators, most studies in the growth-by-(trade) destination literature assume stationarity, cross-sectional independence and homogeneity of the variables, which might be inappropriate for macro panel data. Similarly, VAR approach has its own weaknesses. Both Haltmaier et al. (2007) and Park and Shin (2011) employ their models separately for each country in their sample. Moreover, the assumption of uncorrelated error terms in structural VAR models seems to be unrealistic. In addition to taking these features into account, our analysis covers the most recent data, which includes the very volatile period of the world economy (such as Great Recession, European debt crisis) with the prolonged recession spreading over the (major) world economies. Thus, structural breaks might occur in our time series and require special econometric treatment. Moreover, the economic recession during these volatile periods might change the role of the major economic powers in stimulating growth in the rest of the world. Therefore, we investigate the impacts of both exports to and imports from China on GDPs of developing economies in a heterogeneous panel, which also takes non-stationarity and structural breaks into account. Additionally, using the sample after the Great Recession, we examine how the relationship between trade and growth has changed due to this global economic crisis.

In short, the theoretical literature is ambiguous on which trade direction, North-South or South-South, might bring more benefits to the developing countries, while the current empirical literature seems to ignore some typical features of macro-panel data.

3 Data and methodology

For the analysis, we investigate the standard Cobb–Douglas production function:

$$Y = AK^{\alpha}L^{\beta},$$

where Y is the output, L and K denote the two factors labour and capital, respectively, and A is the total factor productivity, which is a measure of economic efficiency or technology (α and β are the output elasticities of K and L, respectively).

We consider trade as a channel of innovation diffusion, thus A can be represented as a function of exports or imports by partners. Since we would like to investigate the impacts of trade with China during a quite short period of time (since 2000s), and also take the time series properties of data into consideration, we employ the quarterly data rather than yearly data (monthly data for output -usually industrial production- is not available for most of developing countries). However, quarterly data for capital and labour is rare for most of the countries in our sample. Thus, there must be a trade-off between the completeness of the model and the full coverage of data. The following part will present our results with only trade by partner as the explanatory variable. We focus on dynamic specifications, which can mitigate the omitted variable problem through the inclusion of lagged dependent variable.

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[1] Fixed effects regression with Driscoll-Kraay standard errors (Driscoll and Kraay 1998; Hoechle 2007) is only robust to cross-sectional dependence case; see Eberhardt and Teal 2011; Pesaran 2015b for more discussions.

To investigate the consequences of omitted variables, we conduct a robustness check, where capital stock (proxy for *K*) and population (proxy for *L*) with annual frequencies are added into the model (see Section 4.4). Among other options in the literature for handling the mixed frequency of the data, the MIDAS approach (Ghysels et al. 2006) cannot incorporate the time series properties as fully as the CCE estimator and its varieties. Moreover, converting data from low frequency to high frequency is often criticized due to its unrealistic assumptions.

Finally, even with the consideration of labour and capital, we acknowledge that these specifications might not reflect fully the complexity of growth models. For example, one leading candidate in growth regression is institutional quality (Acemoglu et al. 2001). However, during the investigated period (2000–2016) institutional quality changes very little over time. In fact, almost all institutional quality indices are unchanged in the short-run such as Freedom House or Polity indices, therefore, they are not suitable for our regression models. That said, we do acknowledge the important role of institutional quality, not only on growth, but also on trade relations between countries. Therefore, in Section 4.3 we conduct a descriptive analysis to illustrate, whether the institutional quality measures are related with the growth in developing countries trading with China.

3.1   Data description

Our balanced panel dataset includes 22 EME[2] from 2000Q1 to 2016Q4. The inclusion of countries is only based on the availability of balanced data for the whole period of investigation. Our sample starts from the first quarter of 2000, due to the availability of quarterly data thereafter (quarterly data for trade and GDP of developing countries from IMF are often available around 2000). Moreover, it is more reasonable to investigate the impacts of China on developing countries, as its share of international trade has soared only since early 2000s. The included countries account for more than 54% of the total population and 67% of the total GDP in 2015 of all emerging and developing countries in the world, and include the representatives of all major parts of the world. The covered regions are Western Hemisphere (Argentina, Bolivia, Brazil, Chile, Costa Rica, Mexico, Peru), Europe (Croatia, Hungary, Poland, Romania, Turkey), Asia (Philippines, India, Indonesia, Malaysia, Thailand), Russian Commonwealth (Russian Federation, Ukraine, Georgia), and Middle East and Africa (Saudi Arabia, South Africa).

For trade data, we take the quarterly data reported by partner countries provided by the Direction of Trade Statistics (IMF). The classification of advanced economies and emerging and developing economies follows this IMF dataset. Trade value (exports or imports) with the specific group (AdE or EME) is the total value of trade with all countries in that group. The total trade value with AdE, EME and China makes up the total world trade of a country. Our time series are adjusted seasonally by using the X11 adjustment method (package *seasonal* in R, Sax and Eddelbuettel 2018) without the accommodation of transformation, outlier detection,

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[2] We follow the International Monetary Fund (IMF) classification, excluding small island developing countries.

holiday or trading-days adjustments. Following Eicher and Henn (2011), all series are converted to real values (at 2010 constant prices) by the US consumer price index.[3]

For GDP data, we use the GDP real index provided by the International Financial Statistics database (IMF). We convert to US$ using GDP in base year 2010 provided by World Economic Outlook (IMF), then adjust seasonally as we do with trade data. For countries without sufficient data during the examined period (India, Mexico, South Africa, Saudi Arabia and Argentina-data missing mostly in the early 2000s), we use the data from GVAR Database (Mohaddes and Raissi 2018), which has a similar calculation procedure as we do.

Figure 1 illustrates that all of our time series might include structural breaks and trends. While the most recent break dates seem to appear during the global financial crisis (around years 2008 and 2009), other potential break points might be detected in the early 2000s (when economic recessions occur in several countries), or at different time points after the global financial crisis. The upward trends also change their patterns after the crisis (except for GDP and imports from China). Considering that our sample includes countries at different development levels with many geographical and political differences, their break points might be more diverse. Thus, ignoring the structural breaks (both in the level and in the trend, specific for each country or common for the whole sample) might lead to false statistical inferences.

Figure 1: Total GDP and trade volume by partners in 22 EME
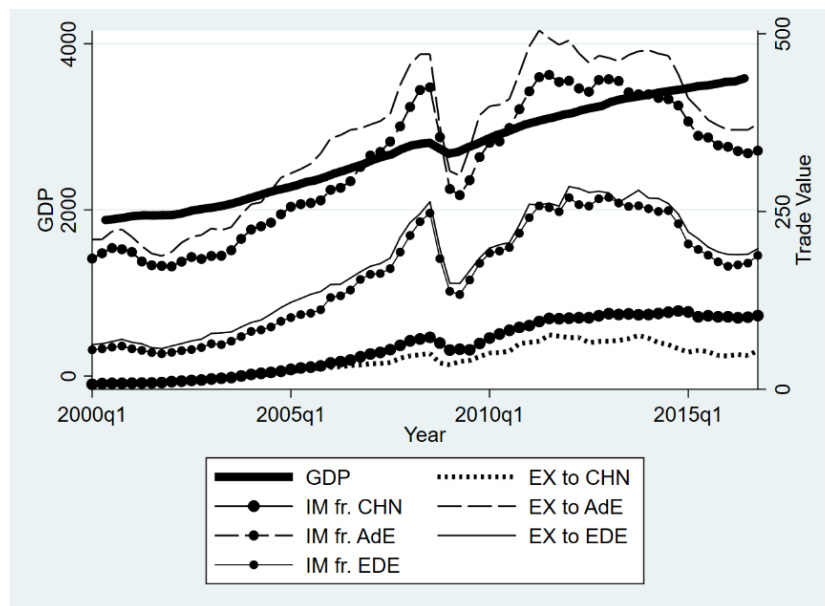
Source: IMF and authors' calculations at constant 2010 price, in billion US$

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[3] Using the corresponding GDP deflator of the reporting countries to deflate our trade data (following Baier and Bergstrand 2007) produces similar results.

Initially, we conduct a cross-sectional dependence test to check whether there is cross-correlation of errors in our panel. Then we check whether our time series are stationary. If the time series are non-stationary (integrated of order one), we check whether they have long-run relationships by deploying a cointegration test. Finally, we use appropriate estimation methods subject to the detected features of the data.

3.2   Large heterogeneous panel data models and estimation methods

To investigate the trade-growth relationship, we consider the following heterogeneous panel data setting, where Y_{it} is the natural logarithm of output (measured by GDP) of country i at time t, EX_k and IM_k refer to the natural logarithm of exports value to country destination k and the natural logarithm of imports value from country source k, respectively. In our models, k represents China (*CHN*), *EME* and *AdE*:

$$Y_{it} = \alpha_{EX,ki} + \beta_{EX,ki}EX_{kit} + \mu_{EX,kit} \; with \; \mu_{EX,kit} = \theta_{ki}'F_{kt} + \varepsilon_{EX,kit} \tag{1}$$

$$Y_{it} = \alpha_{IM,ki} + \beta_{IM,ki}IM_{kit} + \mu_{IM,kit} \; with \; \mu_{IM,kit} = \theta_{ki}'F_{kt} + \varepsilon_{IM,kit} \tag{2}$$

In this setup, α_{ki} and β_{ki} indicate the heterogeneous effects of variables of interest, μ is an error term that consists of an (mx1) vector of unobserved common factors F_t with factor loadings θ_i and an unobserved country-specific effect ε_{it}.

Different from the heterogeneous models, the traditional approach in research on growth-by-(trade) destination literature use pooled or fixed-effects ordinary least squares (FE OLS) and GMM estimators. The main shortcoming of these estimators is that they assume the same effects for every country under a common shock, namely, α_i', β_i' and θ_i' are common across countries. Moreover, these estimators assume the stationarity of the underlying time series, which might cause serious biased estimates, if the data follows unit root patterns. Additionally, they assume the independence of error terms. For macro-economic panel data, all of these assumptions are shown to be unrealistic (Pesaran 2015b).

Pesaran (2006) develops a more general estimator for large heterogeneous panels with a multifactor error structure, called CCE estimation, which is subject to both heterogeneity and cross-sectional dependence. To model the cross-sectional dependence, the main idea of this approach is to add the simple cross-country averages of the variables into the initial equation, as follows:

$$Y_{it} = \alpha_{EX,ki} + \beta_{EX,ki}EX_{kit} + \pounds_{ki}\overline{Y}_t + \Phi_{EX,ki}\overline{EX}_{kt} + \mu_{EX,kit} \tag{3}$$

$$Y_{it} = \alpha_{IM,ki} + \beta_{IM,ki}IM_{kit} + \pounds_{ki}\overline{Y}_t + \Phi_{IM,ki}\overline{IM}_{kt} + \mu_{IM,kit} \tag{4}$$

where the bar above the variables *EX*, *Y* and *IM* represent the cross-country averages of the corresponding variable.

To obtain the coefficients of the model, we use CCE Mean Group estimator (CCE-MG) of Pesaran (2006), which is calculated by simply averaging the estimators of the individual slope

coefficients. The proposed estimation produces consistent and efficient estimates. Kapetanios et al. (2011) examine the performance of CCE estimator in a number of other situations. One important finding is that CCE type estimator is robust when a single structural break is present, the individual variables are non-stationary or stationary and cointegrated or not. In all cases, CCE shows the best performance compared to its alternatives. In addition to CCE-MG, we also employ the Augmented Mean Group estimator (AMG), developed by Bond and Eberhardt (2013). AMG can also accommodate the time series properties such as nonstationarity, cointegration and cross-sectional dependence like CCE-MG. The main idea of this approach is to include a "common dynamic effect", which is taken from the year dummy coefficients of a pooled regression model, to represent a cross-country average of the unobserved common factors.

The following part investigates firstly the nature of our macro panel data in terms of cross-sectional dependence, non-stationarity and structural breaks. If one of these symptoms exists, then traditional approaches like FE or pooled OLS or GMM might not be applied, rationalizing the usage of CCE-MG and AMG estimators.

Finally, to consolidate our main findings, we use dynamic panel data models, which are often implemented in the growth literature. An advantage of the dynamic model is that it includes not only lagged dependent variables, but also weakly exogenous regressors. In our analysis, we use the error correction model (ECM) representation suggested by Eberhardt and Presbitero (2015). As being more advantageous than the original dynamic specifications, ECM allows us to differentiate the long-run and short-run effects, to investigate the error correction term and to examine the cointegration relationship through checking the statistical significance of the error correction term (Eberhardt and Presbitero 2015). The ECM representation, which can be represented as (with the long-run relationship (β), short-run relationship (Φ) and the presence of the long-run equilibrium relations (ρ, $\rho=0$ indicates no cointegration) between trade and GDP):

$$\Delta Y_{it} = \alpha_{EX,ki} + \rho_i(Y_{i,t-1} - \beta_{EX,ki}EX_{ki,t-1} - \theta_{ki}'F_{k,t-1}) + \Phi_{D.EX,ki}\Delta EX_{kit} + \gamma_{F,ki}'\Delta F_{kt} + \varepsilon_{EX,kit} \tag{5}$$

$$\Delta Y_{it} = \alpha_{IM,ki} + \rho_i(Y_{i,t-1} - \beta_{IM,ki}IM_{ki,t-1} - \theta_{ki}'F_{k,t-1}) + \Phi_{D.IM,ki}\Delta IM_{kit} + \gamma_{F,ki}'\Delta F_{kt} + \varepsilon_{IM,kit} \tag{6}$$

Following Eberhardt and Presbitero (2015), we reparameterize (5) and (6) as follows:

$$\Delta Y_{it} = \lambda_{EX,ki} + \lambda_i^{EC}Y_{i,t-1} + \lambda_{ki}^{EX}EX_{ki,t-1} + \lambda_{ki}^{F}{}'\Delta F_{k,t-1} + \lambda_{ki}^{D.EX}\Delta EX_{kit} + \lambda_{ki}^{D.F}{}'\Delta F_{kt} + \varepsilon_{EX,kit} \tag{7}$$

$$\Delta Y_{it} = \lambda_{IM,ki} + \lambda_i^{EC}Y_{i,t-1} + \lambda_{ki}^{IM}IM_{ki,t-1} + \lambda_{ki}^{F}{}'\Delta F_{k,t-1} + \lambda_{ki}^{D.IM}\Delta IM_{kit} + \lambda_{ki}^{D.F}{}'\Delta F_{kt} + \varepsilon_{IM,kit} \tag{8}$$

where $\beta_{ki} = -\lambda_{ki}/\lambda_{EC,ki}$ denotes long-run effect, $\lambda_{D,ki}$ is the short-run effect and $\lambda_{EC,ki}$ represents the long-run equilibrium relationship (cointegration). Similar to Eberhardt and Presbitero (2015), we add the cross-sectional averages of variables in the spirit of Chudik and Pesaran (2015), which allow for weakly exogenous regressors and lagged dependent variable. The final specifications add also further lags (p, max 4) to improve the consistency of the estimation:

$$\Delta Y_{it} = \lambda_{EX,ki} + \lambda_i^{EC} Y_{i,t-1} + \lambda_{ki}^{EX} EX_{ki,t-1} + \lambda_{ki}^{D.EX} \Delta EX_{kit} + \lambda^{Y.CA} \overline{Y}_{t-1} + \lambda_k^{EX.CA} \overline{EX}_{k,t-1} +$$
$$\lambda^{D.Y.CA} \overline{\Delta Y}_t + \lambda_k^{D.EX.CA} \overline{\Delta EX}_{kt} + \sum_{l=1}^{p} \lambda_{k,l}^{D.EX.CA} \overline{\Delta EX}_{k,t-l} + \sum_{l=1}^{p} \lambda_l^{D.Y.CA} \overline{\Delta Y}_{t-l} + \varepsilon_{EX,kit} \qquad (9)$$

$$\Delta Y_{it} = \lambda_{IM,ki} + \lambda_i^{EC} Y_{i,t-1} + \lambda_{ki}^{IM} IM_{ki,t-1} + \lambda_{ki}^{D.IM} \Delta IM_{kit} + \lambda^{Y.CA} \overline{Y}_{t-1} + \lambda_k^{IM.CA} \overline{IM}_{k,t-1} +$$
$$\lambda^{D.Y.CA} \overline{\Delta Y}_t + \lambda_k^{D.IM.CA} \overline{\Delta IM}_{kt} + \sum_{l=1}^{p} \lambda_{k,l}^{D.IM.CA} \overline{\Delta IM}_{k,t-l} + \sum_{l=1}^{p} \lambda_l^{D.Y.CA} \overline{\Delta Y}_{t-l} + \varepsilon_{IM,kit} \qquad (10)$$

Chudik and Pesaran (2015) show that the Dynamic Common Correlated Effects Mean Group (DCCEMG) estimator performs quite well in dynamic heterogenous panel data models with a sample size of N=40 and T=50 (the most similar case with our data), regarding bias and root mean square error (RMSE) criteria. In contrast, as indicated in Chudik and Pesaran (2015)'s experiments, fixed effects estimates have the most severe bias and produce the largest RMSE values in all examined scenarios.

3.3   Cross-sectional dependence test

Cross-sectional dependence can appear due to omitted common effects, spatial dependence or linkages between units, which are typically observed in the macro-economic panel data (Pesaran 2015b). In the growth models, cross-sectional dependency may arise as a result of globally common shocks with heterogeneous impacts across countries, such as the oil crises in the 1970s or the global financial crisis from 2007 onwards. Alternatively, it can be the result of local spill-over effects between countries or regions (Eberhardt and Teal 2011). Ignoring cross-sectional dependence can cause misleading inferences and inconsistency (Pesaran 2015b).

We firstly apply the Breusch-Pagan LM test (Breusch and Pagan 1980), which is simply based on the average of the squared pair-wise correlation of the residuals. This test has good performance when N is relatively small, to say, 10 or less (Pesaran 2015b). Our sample with only 22 countries might be a case for this application. Furthermore, we also report the CD test developed in Pesaran (2004) and Pesaran (2015a), which is a weak cross-sectional dependence test. With large N, this test, which considers the extent of dependence, might be more appropriate than the Breusch-Pagan LM test, which tests the extreme null hypothesis of independence. Moreover, the CD test is proven as powerful in cases of both static and dynamic panels.

Table 1 shows that both Breusch-Pagan LM and Pesaran CD tests reject the null hypothesis of cross-sectional independence or weak cross-sectional dependence, respectively. Therefore, we need to apply panel unit root tests and the estimation methods that are subject to cross-sectional dependence.

Table 1: Cross-sectional dependence tests for variables and residuals

	Variable			Residual			
	Pesaran (2004) CD test			Breusch-Pagan LM test		Pesaran (2004) CD test	
	CD-test	p-value	corr	chi2(231)	p-value	test-statistics	p-value
Y	114.17	0.000	0.91				
EX_{CHN}	100.82	0.000	0.80	5185.03	0.000	28.08	0.000
IM_{CHN}	114.76	0.000	0.92	4938.27	0.000	35.28	0.000
EX_{EME}	115.58	0.000	0.92	4996.65	0.000	45.68	0.000
IM_{EME}	113.69	0.000	0.91	6281.64	0.000	72.38	0.000
EX_{AdE}	99.22	0.000	0.79	5743.00	0.000	51.08	0.000
IM_{AdE}	98.97	0.000	0.79	5227.92	0.000	58.27	0.000

Note: We use *xtcd* command in STATA (Eberhardt 2011b), tests for residuals are conducted after running fixed-effect estimation. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. *Y, EX_{CHN}, IM_{CHN}, EX_{EME}, IM_{EME}, EX_{AdE}, IM_{AdE}* indicate natural log of GDP, exports, imports to China, EME and AdE, respectively.

3.4 Panel unit root test without break

The ignorance of cross-sectional dependence in conducting panel unit root test might lead to misleading statistical inferences (Hlouskouva and Wagner 2006). Therefore, we apply the Pesaran (2007) unit root test that allows cross-sectional dependence. The main idea of this approach is to use cross-sectional averages to proxy for the common component. Table 2 shows that the unit root null hypothesis cannot be rejected for GDP at all choices of lags while for other variables, the null hypothesis is rejected at smaller lag orders and cannot be rejected at higher lag orders. The findings from the Pesaran (2007) test are inconclusive for all variables, except for GDP.

While the Pesaran (2007) approach is to augment the cross-sectional averages for modelling the cross-sectional dependence, the Bai and Ng (2004; 2010) approach uses principal components-based analysis of non-stationarity in idiosyncratic and common components. The Bai and Ng (2004; 2010) approach can overcome the main shortcomings of the Pesaran (2007) one. Firstly, the Pesaran (2007) approach is complicated because it requires to build critical values for each combination of N and T and to truncate the test statistics. Secondly, the Pesaran (2007) approach assumes the same order of integration of common and idiosyncratic components, which might be violated in many cases (see Reese and Westerlund 2016).

However, as Reese and Westerlund (2016) point out, the Bai and Ng (2004; 2010) approach has its own weaknesses compared to the Pesaran (2007) approach. Namely, when N is small, the Bai and Ng (2004; 2010) approach can easily lead to small-sample distortions. Therefore, Reese and Westerlund (2016) propose a PANICCA approach, which combines and takes advantages of the Pesaran (2007) and Bai and Ng (2004; 2010) approaches. The Monte Carlo evidence shows four main strengths of PANICCA over its parents: the inheritance of the generality of the

Bai and Ng (2004; 2010) approach, being user-friendly, the same asymptotic theory as in Bai and Ng (2004; 2010) and the improvements in small-sample performance. Table 3 shows that the null hypothesis of a unit root is rejected at a 10% significance level for the idiosyncratic component of EX_{AdE} while other variables show non-stationarity.

Table 2: Pesaran (2007) unit root tests (with trend)

Variables		Lag								
		0	1	2	3	4	5	6	7	8
Y	Zt-bar	-1.093	0.624	0.121	0.603	2.963	3.264	3.460	2.979	4.166
	p-value	0.137	0.734	0.548	0.727	0.998	0.999	1.000	0.999	1.000
EX_{CHN}	Zt-bar	**-10.152**	**-6.565**	**-4.849**	**-4.710**	**-2.269**	**-1.872**	0.539	-0.009	1.746
	p-value	0.000	0.000	0.000	0.000	0.012	0.031	0.705	0.497	0.960
IM_{CHN}	Zt-bar	**-3.846**	-0.977	0.065	0.019	1.830	0.364	-0.091	-0.378	2.333
	p-value	0.000	0.164	0.526	0.508	0.966	0.642	0.464	0.353	0.990
EX_{EME}	Zt-bar	**-4.728**	**-1.669**	-0.350	-1.112	1.601	1.706	0.785	0.991	2.128
	p-value	0.000	0.048	0.363	0.133	0.945	0.956	0.784	0.839	0.983
IM_{EME}	Zt-bar	**-4.239**	**-1.857**	-0.721	-1.470	0.203	0.330	0.838	-0.206	2.139
	p-value	0.000	0.032	0.235	0.071	0.580	0.629	0.799	0.419	0.984
EX_{AdE}	Zt-bar	**-3.539**	**-2.467**	**-2.599**	**-2.735**	0.127	1.714	2.476	1.776	2.293
	p-value	0.000	0.007	0.005	0.003	0.551	0.957	0.993	0.962	0.989
IM_{AdE}	Zt-bar	**-1.832**	-0.707	**-1.699**	-1.602	1.070	0.956	0.760	1.833	2.655
	p-value	0.033	0.240	0.045	0.055	0.858	0.831	0.776	0.967	0.996

Note: We use *multipurt* command in STATA (Eberhardt 2011a). Our balanced data includes 22 countries from 2000Q1 to 2016Q4. *Y, EX_{CHN}, IM_{CHN}, EX_{EME}, IM_{EME}, EX_{AdE}, IM_{AdE}* indicate natural log of GDP, exports, imports to China, EME and AdE, respectively.

3.5   Panel unit root test with break

Finally, our studied period covers very volatile episodes of trade and economic growth, namely the Great Recession starting in 2007 and the recent sovereign debt crisis in Southern Europe. The structural breaks in our time series, if ignored, can cause distortions of the test results. We apply a panel unit root test allowing for heterogeneous breaks in both trend and levels and correcting for cross-sectional dependence developed by Im et al. (2010) and Lee and Tieslau (2019).

This test is based on the LM unit root test and is implemented by the procedure introduced in Im et al. (2010). Specifically, using the "maximum F test" developed in Lee and Strazicich (2003) and Lee et al. (2012), we initially test the existence of two trend or level breaks in series. If the existence of two breaks is rejected, we repeat the process with one trend break. If no trend break is found, we use the procedure of Lee and Strazicich (2003) for testing the two level breaks, then one level break if the two breaks are not present. Finally, when there is no break at all, we use the procedure of Schmidt and Phillips (1992). After all of the steps are through, we

calculate the panel cross-sectionally augmented LM unit root test statistics (CA-LM test statistics) correcting for cross-correlation using Pesaran (2017) approach. Table 4 presents the tests allowing for time fixed effects. The inclusion of time effects across the panel helps to reduce the impact of error correlation.

Table 3: Reese and Westerlund (2016) unit root tests

Variables		Common Factors	Idiosyncratic components		
		ADF Test	P_a	P_b	PMSB
Y	Test Statistics	8.246	1.652	2.437	3.579
	p-value	1.000	0.950	0.993	1.000
EX_{CHN}	Test Statistics	-0.608	-1.126	-0.968	-0.773
	p-value	0.456	0.130	0.167	0.220
IM_{CHN}	Test Statistics	8.246	0.393	0.417	0.469
	p-value	1.000	0.653	0.662	0.680
EX_{EME}	Test Statistics	1.514	-0.67	-0.630	-0.510
	p-value	0.974	0.251	0.265	0.305
IM_{EME}	Test Statistics	0.973	-1.134	-1.010	-0.831
	p-value	0.922	0.129	0.156	0.203
EX_{AdE}	Test Statistics	0.901	-1.535	-1.329	-1.056
	p-value	0.912	0.062	0.092	0.145
IM_{AdE}	Test Statistics	1.406	0.278	0.288	0.320
	p-value	0.968	0.609	0.613	0.626

Note: We use xtpanicca command in STATA to conduct PANICCA test of Reese and Westerlund (2016) with trend and BIC lag selection criteria. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. Y, EXCHN, IMCHN, EXEME, IMEME, EXAdE, IMAdE indicate natural log of GDP, exports, imports to China, EME and AdE, respectively.

Table 4: CA-LM unit root test

	CA-LM Test Statistics	Most Frequent Years of Break	No. of Countries experiencing break during the most frequent years of break	Total countries experiencing break
Y	-1.216	2008–2009	13	18
EX_{CHN}	-6.347***	2002–2003	20	21
IM_{CHN}	1.962	2002–2003; 2008–2009	13	15
EX_{EME}	-0.715	2008–2009	10	13
IM_{EME}	-0.298	200–-2003; 2008–2009	4	11
EX_{AdE}	-0.681	2008–2010	11	18
IM_{AdE}	-2.033**	2002–2003; 2008–2009	10	14

Note: GAUSS codes provided at https://sites.google.com/site/junsoolee/codes. The 1%, 5% and 10 % critical values for the panel unit root test are: -2.326, -1.645 and -1.282, respectively. ***, **, and * denote significance at the 1%, 5% and 10%, respectively. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. *Y, EX_{CHN}, IM_{CHN}, EX_{EME}, IM_{EME}, EX_{AdE}, IM_{AdE}* indicate natural log of GDP, exports, imports to China, EME and AdE, respectively.

Results of the panel CA-LM unit root test show that the null hypothesis of unit root is rejected for EXCHN and IMAdE while all other time series might be non-stationary, if panel unit root test accommodates both cross-correlation and heterogeneous structural breaks. The detected break locations determined by the Im et al. (2010) and Lee and Tieslau (2019) procedures are reasonable. Namely, financial crisis periods (2008–2009) witness the most frequent breaks in the examined countries. Table A1 in the Appendix shows in more details the specific break dates for each country in our sample.

3.6   Cointegration test in dependent panels with structural breaks

Next, we conduct the Westerlund and Edgerton (2008) panel cointegration test to determine the existence of a long-run relationship between output and exports/ imports by trade partners. Westerlund and Edgerton (2008) approach accommodates the heteroskedastic and correlated errors, time trends, and unknown heterogeneous break dates in the level of different panel units. However, their procedure does not allow for trend breaks. This, according to our previous findings using CA-LM test, is not suitable for our sample of trend-break dominance. Nevertheless, it is helpful to see whether there exists a long-run relationship between our variables by applying the Westerlund and Edgerton (2008) panel test. Table 5 shows that the

Table 5: Westerlund and Edgerton (2008) cointegration test

Y and EX_{CHN}					Y and IM_{CHN}				
	Z tau		Z phi			Z tau		Z phi	
Model	Value	P-value	Value	P-value	Model	Value	P-value	Value	P-value
Regime shift	**-3.391**	0.000	**-3.099**	0.001	Regime shift	0.074	0.530	-0.439	0.330
Level break	0.137	0.555	0.095	0.538	Level break	3.056	0.999	1.939	0.974
No break	**-3.879**	0.000	**-4.292**	0.000	No break	0.073	0.529	-0.873	0.191
Y and EX_{EME}					Y and IM_{EME}				
	Z tau		Z phi			Z tau		Z phi	
Model	Value	P-value	Value	P-value	Model	Value	P-value	Value	P-value
Regime shift	0.309	0.622	0.409	0.659	Regime shift	0.977	0.836	0.889	0.813
Level break	**-0.337**	0.368	**0.025**	0.510	Level break	0.143	0.557	-0.073	0.471
No break	1.478	0.930	1.343	0.910	No break	-0.867	0.193	**-1.598**	0.055
Y and EX_{AdE}					Y and IM_{AdE}				
	Z tau		Z phi			Z tau		Z phi	
Model	Value	P-value	Value	P-value	Model	Value	P-value	Value	P-value
Regime shift	**-1.925**	0.027	-1.431	0.076	Regime shift	0.575	0.717	-0.294	0.384
Level break	-1.251	0.105	-1.214	0.112	Level break	-0.631	0.264	-0.991	0.161
No break	-1.082	0.140	-1.448	0.074	No break	-1.077	0.141	-1.374	0.085

Note: GAUSS code is available at https://sites.google.com/site/perjoakimwesterlund/home/gauss-codes. Max lag is 8, trimming is 0.1. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. *Y, EX_{CHN}, IM_{CHN}, EX_{EME}, IM_{EME}, EX_{AdE}, IM_{AdE}* indicate natural log of GDP, exports, imports to China, EME and AdE, respectively.

null hypothesis of no cointegration is rejected at the 10% level for the relationships: Y-EX_{CHN}, Y-EX_{AdE}, Y-IM_{AdE} and Y-IM_{EME}. However, most of the rejection is on the "no-break" model, which can be inappropriate according to the previous findings.

4 Growth-by-(trade) destination: China and growth in the global South

4.1 Major findings

According to the results of the tests, our time series have all typical features of macro-economic panel data in growth empirics as reviewed by Eberhardt and Teal (2011; 2012): cross-sectional dependence, non-stationarity, structural breaks and possible cointegration.

We employ the CCE estimator developed by Pesaran (2007), which accommodates all of these features and is appropriate for growth regression models (Eberhardt and Teal, 2011; 2012).

The findings from the CCE-MG estimation (Table 6) show the positive and significant effects of imports from China on the output level in the Global South. One percent increase in imports volume from China is associated with around 0.11%, 0.07% and 0.05% increases in GDP level according to FE, CCE-MG and AMG approaches, respectively. However, these figures are still smaller than the corresponding figures of EME (around 0.16%, 0.08% and 0.05%, respectively) and AdE (0.18%, 0.12% and 0.1%). While exports to EME and AdE both enhance growth, exports to China contribute insignificantly to the GDP of the countries in our sample.

The results of the DCCE-MG approach at different lags (Tables 7a, 7b and 7c) are consistent with that of CCE estimator: contributions of imports from China are significant, but lower than that of EME and AdE; and, in contrast to exports to EME and AdE, exports to China are irrelevant to growth. Furthermore, the dynamic model allows to differentiate between long-run and short-run effects. In general, the positive long-run effects of imports on GDP are two times higher than the short-run effects. Different from the static models, the dynamic models indicate that exports to China or EME
are both unimportant to growth in the long-run although exports to EME still have some impacts in the short-run. The significant and negative EC coefficient terms in all specifications of Tables 7a, 7b and 7c (except for full FE models) confirm the presence of the cointegration or long-run equilibrium relationship between trade and GDP of the panel.

In terms of methodology, there is a large difference between the FE and the CCE-MG/AMG, both in static and dynamic settings. FE, which does not account for the cross-sectional dependence, non-stationarity, cointegration and structural breaks, seems to over-estimate the contributions of trade in general to growth. Diagnostic tests show that RMSE and CD test statistics in FE models are considerably higher than that of CCE-MG and AMG, which are indicators of poorer performance of FE compared to CCE-MG and AMG.

Table 6: Static models

	FE			CCE-MG			AMG		
	Full	Full (dummy crisis)	After 2008	Full	Full (dummy crisis)	After 2008	Full	Full (dummy crisis)	After 2008
	Y	Y	Y	Y	Y	Y	Y	Y	Y
EX_{CHN}	0.007	0.007	-0.001	0.006	0.007	0.014	0.002	0.002	0.003
	(0.012)	(0.012)	(0.013)	(0.010)	(0.009)	(0.010)	(0.007)	(0.007)	(0.012)
CD test	13.150	12.990	6.940	-3.180	-3.110	-2.800	-3.430	-3.430	-2.102
RMSE	0.087	0.087	0.063	0.026	0.024	0.014	0.03	0.028	0.018
IM_{CHN}	0.110***	0.110***	0.154***	0.074***	0.074***	0.071***	0.048***	0.050***	0.055***
	(0.012)	(0.012)	(0.016)	(0.0124)	(0.012)	(0.013)	(0.012)	(0.012)	(0.014)
CD test	4.020	3.630	6.210	-4.260	-4.230	-3.670	0.180	0.330	-2.160
RMSE	0.070	0.070	0.049	0.020	0.019	0.013	0.024	0.022	0.016
EX_{EME}	0.110***	0.110***	0.122***	0.088**	0.089**	0.058***	0.038**	0.036*	0.028
	(0.036)	(0.036)	(0.039)	(0.038)	(0.036)	(0.020)	(0.020)	(0.018)	(0.023)
CD test	-2.407	-2.408	2.931	-1.990	-1.880	-3.020	-2.820	-2.600	-3.200
RMSE	0.080	0.080	0.058	0.023	0.021	0.013	0.027	0.025	0.016
IM_{EME}	0.167***	0.167***	0.161***	0.097***	0.088***	0.076***	0.062***	0.053***	0.047***
	(0.021)	(0.021)	(0.031)	(0.022)	(0.023)	(0.0153)	(0.0147)	(0.015)	(0.017)
CD test	8.660	8.630	6.810	-1.210	-1.700	-3.180	-1.050	-1.590	-3.040
RMSE	0.066	0.066	0.053	0.022	0.020	0.013	0.025	0.024	0.016
EX_{AdE}	0.138***	0.138***	0.119***	0.120***	0.122***	0.087***	0.0895***	0.087***	0.055**
	(0.036)	(0.037)	(0.037)	(0.025)	(0.026)	(0.023)	(0.019)	(0.019)	(0.023)
CD test	-2.500	-2.520	0.713	-4.420	-4.500	-2.970	0.870	0.780	-1.690
RMSE	0.079	0.079	0.06	0.025	0.023	0.014	0.027	0.025	0.018
IM_{AdE}	0.178***	0.178***	0.183***	0.125***	0.12***	0.093***	0.1054***	0.0973***	0.076***
	(0.033)	(0.033)	(0.032)	(0.023)	(0.023)	(0.015)	(0.016)	(0.015)	(0.015)
CD test	1.810	1.748	6.143	-2.580	-2.860	-3.420	-0.920	-1.090	-1.820
RMSE	0.074	0.071	0.054	0.020	0.019	0.012	0.0233	0.022	0.016

Note: The numbers in brackets are standard errors (robust for FE, for MG and AMG, the variance is simply the variance of the unit specific coefficients, thus it cannot be robust)); *, ** and ***, indicate significance at the 10%, 5% and 1% levels, respectively. All models include a trend. We use xtmg command in STATA (Eberhardt and Presbitero 2015). CD test of Pesaran (2015a) is standard normally distributed under the null hypothesis. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. EX_{CHN}, IM_{CHN}, EX_{EME}, IM_{EME}, EX_{AdE}, IM_{AdE} indicate natural log of exports, imports to China, EME and AdE, respectively. We also conduct pooled CCE approach, which might produce more robust results for small sample (using xtdcce2 command in STATA, Ditzen 2016), and find similar results of coefficients but with larger absolute value of RMSE compared to CCE-MG and AMG. To save space, we do not report the pooled CCE results here but can provide as request.

Table 7a: Dynamic models with the independent variables export and import to China

	FE		DCCE-MG 1-lag		DCCE-MG-2 lag		DCCE-MG-4 lag	
	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008
	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY
EX_{CHN}								
LRA	0.430	0.061	-0.003	-0.004	-0.004	-0.003	0.004	-0.005
	(0.614)	(0.042)	(0.009)	(0.012)	(0.009)	(0.011)	(0.007)	(0.008)
SR	0.003*	0.003	0.0059	0.008	0.005	0.008	0.007	0.006
	(0.002)	(0.003)	(0.005)	(0.009)	(0.005)	(0.008)	(0.005)	(0.009)
EC coefficient $Y(t-1)$	-0.005	-0.038***	-0.216***	-0.443***	-0.216***	-0.456***	-0.263***	-0.487***
	(0.006)	(0.010)	(0.039)	(0.054)	(0.039)	(0.053)	(0.045)	(0.058)
CD test	26.680	23.450	-3.100	-1.840	-3.020	-1.850	-3.080	-2.060
RMSE	0.016	0.016	0.011	0.009	0.011	0.008	0.010	0.008
IM_{CHN}								
LRA	0.028	0.140***	0.060***	0.082***	0.058***	0.090**	0.053***	0.095***
	(0.241)	(0.042)	(0.016)	(0.027)	(0.017)	(0.035)	(0.016)	(0.033)
SR	0.044***	0.048***	0.030***	0.041***	0.0295***	0.0390***	0.029***	0.042***
	(0.008)	(0.015)	(0.007)	(0.013)	(0.008)	(0.015)	(0.008)	(0.017)
EC coefficient $Y(t-1)$	-0.006	-0.053***	-0.292***	-0.463***	-0.311***	-0.473***	-0.352***	-0.541***
	(0.009)	(0.014)	(0.039)	(0.051)	(0.045)	(0.058)	(0.045)	(0.054)
CD test	17.270	11.570	-3.400	-2.320	-3.490	-1.730	-3.540	-1.990
RMSE	0.015	0.015	0.011	0.0087	0.010	0.008	0.009	0.007

Note: The numbers in brackets are standard errors (robust for FE, for MG and AMG, the variance is simply the variance of the unit specific coefficients, thus it cannot be robust); *, ** and ***, indicate significance at the 10%, 5% and 1% levels, respectively. All models include trend. We use xtmg command in STATA (Eberhardt and Presbitero 2015). CD test of Pesaran (2015a) is standard normally distributed under the null hypothesis. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. EX_{CHN}, IM_{CHN} indicate natural log of exports, imports to China, respectively.

Our findings on moderate impacts of trade with China on economic growth in the developing economies might attribute to the selection of countries in our analysis. Shafaeddin (2010) presents that the first-tier newly industrialized economies like Korea and Taiwan might benefit most from the emergence of China, while second-tier economies like Singapore, Indonesia, Malaysia and Thailand benefit less, and lastly low-income countries might take the smallest portion of the cake. Our samples cover not only the countries close to China but also economies far from China, moreover, most of the included countries can be classified as second-tier newly industrialized economies. Whether these features of our sample emphasize or underplay the growth impacts of trade with China will be investigated in Section 4.3.

Table 7b: Dynamic models with the independent variables export and import to emerging economies except to China

	FE		DCCE-MG 1-lag		DCCE-MG-2 lag		DCCE-MG-4 lag	
	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008
	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY
EX_{EME}								
LRA	0.303	0.249***	0.032	0.030	0.031	0.027	0.025	0.011
	(0.264)	(0.041)	(0.041)	(0.033)	(0.041)	(0.031)	(0.031)	(0.032)
SR	0.053***	0.061***	0.034***	0.046**	0.034***	0.046**	0.013***	0.040*
	(0.010)	(0.014)	(0.012)	(0.020)	(0.012)	(0.020)	(0.037)	(0.021)
EC coefficient $Y(t-1)$	-0.007	-0.044***	-0.208***	-0.444***	-0.214***	-0.489***	-0.269***	-0.549***
	(0.007)	(0.011)	(0.036)	(0.049)	(0.037)	(0.046)	(0.040)	(0.054)
CD test	11. 050	7.188	-3.880	-2.280	-3.690	-2.180	-3.180	-2.410
RMSE	0.015	0.015	0.011	0.008	0.011	0.008	0.009	0.007
IM_{EME}								
LRA	0.242***	0.191***	0.088***	0.080***	0.086***	0.066**	0.070***	0.083***
	(0.085)	(0.041)	(0.027)	(0.028)	(0.028)	(0.028)	(0.022)	(0.031)
SR	0.059***	0.068***	0.035***	0.029***	0.033***	0.031***	0.030***	0.035***
	(0.011)	(0.011)	(0.010)	(0.010)	(0.0095)	(0.011)	(0.009)	(0.011)
EC coefficient $Y(t-1)$	-0.012	-0.046***	-0.250***	-0.465***	-0.258***	-0.494***	-0.306***	-0.543***
	(0.008)	(0.013)	(0.039)	(0.051)	(0.041)	(0.047)	(0.041)	(0.051)
CD test	9.051	4.157	-3.970	-2.230	-3.900	-2.200	-3.660	-2.340
RMSE	0.015	0.014	0.0106	0.009	0.010	0.008	0.009	0.007

Note: The numbers in brackets are standard errors (robust for FE, for MG and AMG, the variance is simply the variance of the unit specific coefficients, thus it cannot be robust); *, ** and ***, indicate significance at the 10%, 5% and 1% levels, respectively. All models include trend. We use xtmg command in STATA (Eberhardt and Presbitero 2015). CD test of Pesaran (2015a) is standard normally distributed under the null hypothesis. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. EX_{EME}, IM_{EME} indicate natural log of exports, imports to EME, respectively.

4.2 Financial crisis: Turning point of the China's rise

We examine how the growth-by-(trade) destination hypothesis in the developing countries is affected by the Great Recession by analyzing the 2008Q1–2016Q4 period separately. We acknowledge that the reduction of years might lead to larger bias and RMSE as proven in Monte Carlo experiments of Chudik and Pesaran (2015), however, to check if the estimates stay robust, we still use the CCE approach for this period. Indeed, the CCE approach performs still much better than fixed effects estimates.

The results in Tables 6 and 7a–7c show that the contributions of trade with China to the output of the studied economies increase (in AMG and DCCE-MG estimations), or are almost

Table 7c: Dynamic models with the independent variables export and import to advanced economies

	FE		DCCE-MG 1-lag		DCCE-MG-2 lag		DCCE-MG-4 lag	
	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008
	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY	ΔY
EX_{AdE}								
LRA	0.544	0.320***	0.089**	0.097***	0.093**	0.104***	0.095***	0.116***
	(0.370)	(0.058)	(0.370)	(0.034)	(0.037)	(0.037)	(0.025)	(0.037)
SR	0.057***	0.061***	0.039***	0.054***	0.040***	0.056***	0.042***	0.063***
	(0.014)	(0.019)	(0.010)	(0.016)	(0.009)	(0.016)	(0.010)	(0.018)
EC coefficient Y(t-1)	-0.009	-0.043***	-0.235***	-0.402***	-0.236***	-0.433	-0.282***	-0.443***
	(0.008)	(0.010)	(0.037)	(0.052)	(0.037)	(0.054)	(0.037)	(0.067)
CD test	12.546	8.821	-4.030	-1.730	-3.830	-1.780	-3.520	-1.960
RMSE	0.015	0.015	0.011	0.009	0.011	0.008	0.009	0.007
IM_{AdE}								
LRA	-2.687	0.232***	0.133***	0.117***	0.126***	0.098***	0.096***	0.098***
	(35.123)	(0.058)	(0.026)	(0.028)	(0.025)	(0.026)	(0.019)	(0.029)
SR	0.074***	0.086***	0.051***	0.048***	0.049***	0.043***	0.041***	0.042***
	(0.012)	(0.012)	(0.011)	(0.012)	(0.010)	(0.012)	(0.008)	(0.013)
EC coefficient Y(t-1)	-0.001	-0.038***	-0.292***	-0.514***	-0.291***	-0.514***	-0.341***	-0.596***
	(0.007)	(0.011)	(0.041)	(0.050)	(0.041)	(0.057)	(0.041)	(0.053)
CD test	9.005	4.168	-3.640	-1.590	-3.540	-1.240	-3.700	-1.930
RMSE	0.015	0.014	0.011	0.009	0.010	0.008	0.009	0.008

Note: The numbers in brackets are standard errors (robust for FE, for MG and AMG, the variance is simply the variance of the unit specific coefficients, thus it cannot be robust); *, ** and ***, indicate significance at the 10%, 5% and 1% levels, respectively. All models include trend. We use xtmg command in STATA (Eberhardt and Presbitero 2015). CD test of Pesaran (2015a) is standard normally distributed under the null hypothesis. Our balanced data includes 22 countries from 2000Q1 to 2016Q4. EX_{AdE}, IM_{AdE} indicate natural log of exports, imports to AdE, respectively.

unchanged (in CCE-MG estimation) over time. Namely, in the static models, during 2008–2016 each 1% increase in imports value from China, lead to 0.055% (in AMG model) increase in growth in its partners after the crisis, compared to 0.048% over the whole period (for CCE-MG are 0.071% and 0.074%, respectively). In contrast, the corresponding numbers for EME are 0.076% for post-crisis and 0.097% for the whole period in CCE-MG model (0.047% and 0.062% for AMG models, respectively). Imports from AdE also contribute smaller to growth over time, 0.125% for the whole period and 0.093% for the post-crisis in CCE-MG model (0.105% and 0.076%, respectively, for AMG model). More obviously, in the dynamic setting, the long-run effects of imports from China after the crisis are almost 50% higher than that in the whole period while imports from EME and AdE, both in short and long-run, contribute less to growth in post-crisis period in almost all specifications. Therefore, the global financial crisis can

be seen as a turning point for China's increasing role in driving the growth in the developing world.

Regarding the role of exports during the crisis, our models indicate trivial contributions of exports to China. Using a smaller sample of only 8 Asian partner countries, Park and Shin (2011) show the non-robust effects of exports to China on growth. The argument that exports to China support the recovery of the developing economies, or in other words, China's demand can supplement that of the advanced economies in driving growth in the developing world, still lacks robust evidence.

4.3 Negligible roles of the geographical location, economic and institutional development levels

We further investigate the impacts of imports from China on growth at the individual level. Figure 2 shows that the geographical distance between China and its partners plays a negligible role in determining consequences of the imports from China. Geographical distance is often a major determinant of trade, as often seen in gravity models (Deardorff 1998). However, Figure 2 demonstrates that distance might not be important for a country to benefit from trade with China. Countries far from China like Brazil or Argentina can take advantages of trading with China to the same extent as China's closer neighbours such as Thailand or India. This might be explained by the globalization process, which leads to very deep and complex integrations beyond the geographical barriers.

Figure 2: Weak correlation between location and benefits from imports from China
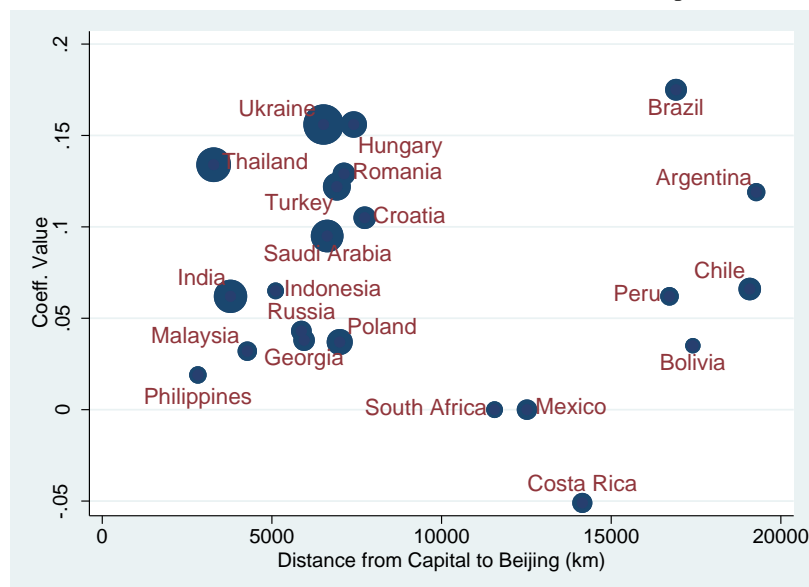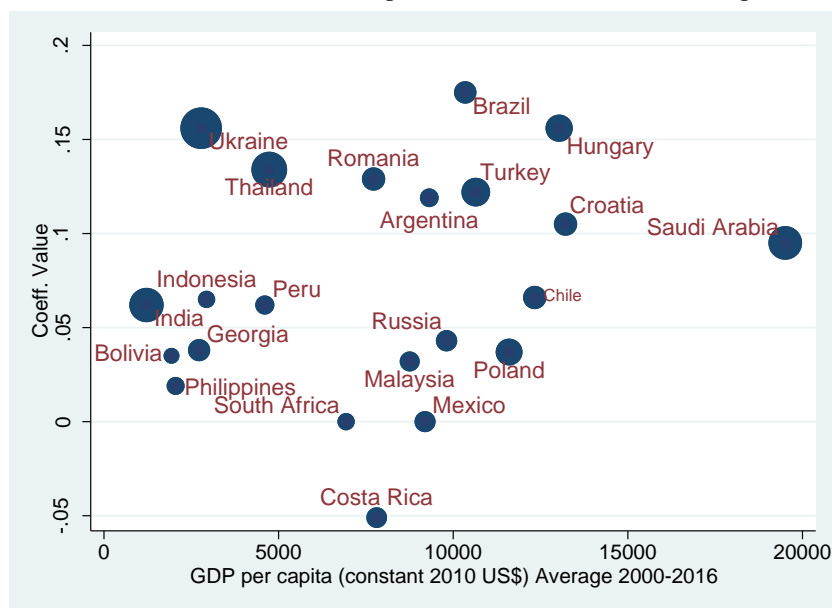

Note: Coefficient values extracted for individual countries in the sample from static specification in Table 6 (to save space, we do not present the graph drawn from coefficient values from dynamic specification in Tables 7a, 7b and 7c, which also shows the weak correlation between the two variables). Distance data is from Gleditsch and Ward (2001). The size of circle presents standard errors.

Similarly, Figure 3 indicates that impacts of imports from China on growth in the Global South are almost independent of the economic development levels of the partner countries. This seems to indicate that the trade links with China affect the growth of the Global South in very homogenous ways.

In addition to this, Figure 4 also illustrates a weak correlation between institutional quality and benefits from trade with China. Institutional quality is measured by World Bank Worldwide Governance Indicators. This data, similar with other institutional quality indices, is often quite stable and almost unchanged from 2000 to 2016, because political and institutional changes happen very slowly. The vague relationship might reflect that political development does not matter significantly for countries to enjoy benefits from trade with China.

However, these conclusions should be treated with care as our analysis here is only descriptive and the mechanism of effects might be more complicated. This mechanism may even have a time-varying nature. Unfortunately, the data limitations do not allow us to investigate these relationships with more rigor. Further research might also examine; if geographical distance, economic and political developments do not determine the positive effects of their trade with China, then which features do?

Figure 3: Weak correlation between development level and benefits from imports from China

Note: Coefficient values extracted for individual countries in the sample from static specification in Table 6 (to save space, we do not present the graph drawn from coefficient values from dynamic specification in Tables 7a, 7b and 7c, which also shows a weak correlation between the two variables). GDP data is from World Bank. The size of circle presents standard errors.

Figure 4: Weak correlation between institutional quality and benefits from imports from China
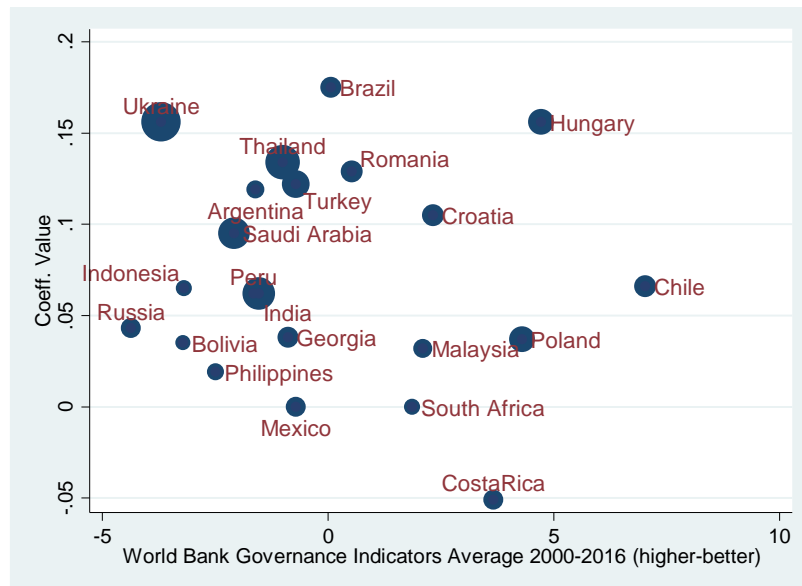
Note: Coefficient values extracted for individual countries in the sample from static specification in Table 6 (to save space, we do not present the graph drawn from coefficient values from dynamic specification in Tables 7a, 7b and 7c, which also shows the weak correlation between the two variables). Institutional quality data is from World Bank Worldwide Governance Indicators database (https://info.worldbank.org/governance/wgi/). The index is the total value of 6 dimensions of governance, each between -2.5 to 2.5 with a higher value indicating better quality. The size of circle presents standard errors.

4.4   Sensitivity analysis: Models with labour and capital controls

As a robustness check, Table 8 presents the main results when we add capital stock at constant 2011 national prices (to proxy for capital K) and population (to proxy for labor L), both from Penn World Table version 9.1 (Feenstra et al. 2015). Major results of Tables 6 and 7a, 7b and 7c remain: Trade with China becomes more important after the crisis and its contributions to growth in developing countries are still lower than trade with AdE and EME. Compared with the models without labour and capital controls (Tables 6, 7a, 7b, 7c), the magnitudes of the coefficient for the trade variables are smaller and CD tests and RMSE show some improvements. While the capital variable contributes positively and significantly to growth as suggested by the theory, the coefficient for population is statistically insignificant. The control variables add some plausibility and efficiency to the model; however, it is noted that both population and capital variables are at annual frequencies, which might not reflect fully the impacts of labour and capital on output fluctuations at quarterly frequency. Table 9 reports the results of fixed effects estimation for dynamic panel data at annual frequency. Major findings on the smaller contributions of imports from China than that from EME and AdE remain unchanged. However, it is noted that FE model presented in Table 9 does not take the typical features of macro panels into account.

Table 8: Sensitivity analysis with labor and capital as additional control variables

Static model

Dependent Variable: Y	CCE-MG EX$_{CHN}$		CCE-MG IM$_{CHN}$		CCE-MG EX$_{EME}$		CCE-MG IM$_{EME}$		CCE-MG EX$_{AdE}$		CCE-MG IM$_{AdE}$	
	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008
EX or IM	0.007	0.011	0.039***	0.050***	0.051**	0.058***	0.048***	0.054***	0.049***	0.061***	0.073***	0.065***
	(0.006)	(0.009)	(0.008)	(0.012)	(0.022)	(0.021)	(0.014)	(0.013)	(0.018)	(0.020)	(0.015)	(0.014)
Population	0.127	-2.758	1.697	-3.357	-0.428	-4.932	-4.612	-5.205	1.035	-0.921	-2.864	-3.086
	(3.482)	(5.835)	(3.474)	(5.423)	(3.721)	(6.298)	(3.099)	(6.733)	(3.449)	(9.085)	(2.710)	(5.486)
Capital	1.097***	2.724***	1.033***	1.950***	0.861**	2.376***	0.914***	2.269***	1.378***	2.842***	0.884***	2.204***
	(0.414)	(0.735)	(0.333)	(0.620)	(0.412)	(0.650)	(0.360)	(0.680)	(0.379)	(0.769)	(0.254)	(0.539)
CD test	-3.760	-2.320	-3.450	-2.840	-3.440	-2.640	-2.510	-2.960	-4.260	-1.960	-3.910	-2.630
RMSE	0.015	0.010	0.014	0.010	0.013	0.010	0.014	0.010	0.014	0.010	0.013	0.010

Dynamic model

Dependent Variable: D.Y	DCCE-MG-1 lag EX$_{CHN}$		DCCE-MG-1 lag IM$_{CHN}$		DCCE-MG-1 lag EX$_{EME}$		DCCE-MG-1 lag IM$_{EME}$		DCCE-MG-1 lag EX$_{AdE}$		DCCE-MG-1 lag IM$_{AdE}$	
	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008
LRA(EX or IM)	-0.007	-0.015*	0.045***	0.060**	0.038	0.025	0.048**	0.059**	0.053***	0.065*	0.086***	0.079***
	(0.006)	(0.009)	(0.011)	(0.023)	(0.027)	(0.030)	(0.019)	(0.023)	(0.024)	(0.036)	(0.019)	(0.026)
SR(EX or IM)	0.004***	0.005***	0.025***	0.035***	0.036***	0.047***	0.029***	0.027***	0.035***	0.050***	0.046***	0.037***
	(0.005)	(0.007)	(0.007)	(0.013)	(0.011)	(0.020)	(0.008)	(0.012)	(0.010)	(0.020)	(0.010)	(0.013)
EC coefficient Y(t-1)	-0.355***	-0.538***	-0.415***	-0.553***	-0.355***	-0.553***	-0.359***	-0.539***	-0.365***	-0.560***	-0.411***	-0.576***
	(0.045)	(0.051)	(0.045)	(0.051)	(0.038)	(0.052)	(0.041)	(0.055)	(0.041)	(0.056)	(0.047)	(0.053)
D.Population	0.133	0.982	0.136	1.825	-0.399	-0.260	-1.325	1.120	-0.544	1.610	-1.301	0.810
	(1.165)	(3.989)	(1.608)	(2.106)	(1.942)	(4.156)	(1.769)	(3.982)	(1.704)	(4.120)	(2.680)	(3.202)
D.Capital	0.995***	1.146***	0.660***	0.753***	0.716***	0.971***	0.658***	1.025***	0.789***	1.023***	0.381***	0.598***
	(0.153)	(0.202)	(0.156)	(0.151)	(0.211)	(0.154)	(0.184)	(0.173)	(0.224)	(0.166)	(0.207)	(0.216)
CD test	-1.570	-0.750	-2.170	-0.650	-2.760	-0.550	-3.020	-1.220	-3.240	0.090	-3.300	-0.780
RMSE	0.010	0.009	0.010	0.008	0.010	0.008	0.010	0.008	0.010	0.008	0.010	0.008

Note: similar Tables 7a,b,c.

Table 9: Fixed effects estimation of annual panel data

Dynamic model	Annual Data	Annual Data	Annual Data	Annual Data	Annual Data	Annual Data
	FE	FE	FE	FE	FE	FE
Dependent Variable: D.Y	EX_{CHN}	IM_{CHN}	EX_{EME}	IM_{EME}	EX_{AdE}	IM_{AdE}
L.D.Y	0.132*	0.123**	0.116*	0.138**	0.114*	0.100
	(0.066)	(0.054)	(0.066)	(0.051)	(0.058)	(0.063)
D. EX or IM	-0.005	0.063***	0.050**	0.079**	0.079***	0.099***
	(0.010)	(0.013)	(0.020)	(0.023)	(0.018)	(0.021)
D.Population	-1.500	-1.358	-1.386	-1.267**	-1.372	-1.232
	(1.679)	(1.344)	(1.594)	(1.520)	(1.441)	(1.327)
D.Capital	0.872***	0.518***	0.874***	0.584**	0.876***	0.634***
	(0.202)	(0.099)	(0.201)	(0.116)	(0.191)	(0.136)
R-squared	0.495	0.557	0.517	0.566	0.537	0.587
Country and Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: The numbers in brackets are robust standard errors; *, ** and ***, indicate significance at the 10%, 5% and 1% levels, respectively. Our balanced data includes 22 countries from 2000 to 2016. EX_{CHN}, IM_{CHN}, EX_{EME}, IM_{EME}, EX_{AdE}, IM_{AdE} indicate natural log of exports, imports to China, EME and AdE, respectively. For dynamic panel data, GMM is another alternative. However, considering that the parameter of lagged dependent variable is very small (highest at 0.138, even insignificant at 5% in some specifications) and T and N are small, Judson and Owen (1999) show that GMM is not better than FE regarding bias, S.E. and RMSE criteria.

5   Conclusions

Our article quantifies the impacts of trade with China on GDP of emerging and developing economies. We find positive contributions of imports from China to GDP, although such positive contributions are still lower than that of EME and AdE. However, impacts of China on growth becomes much more significant since the financial crisis while EME and AdE show decreasing or almost unchanged role in pushing growth in the Global South. These findings seem to confirm the arguments of international studies on China as a new and benign hegemon on the horizon. The developing world's growth is increasingly dependent on Chinese goods and services. Strengthening trade with China might be indispensable for the Global South to sustain growth in the future. This puts more serious pressure on policy makers in, on the one hand, achieving short-run growth goals through promoting imports from China and, on the other hand, ensuring the competitiveness and independence of domestic production in the long-run.

Our analysis shows insignificant contributions of the exports to China on growth in its developing partners. Most of the exports to China from the developing world are raw materials or low-technological products, which contribute marginally to growth. Moreover, the rise of China might end up discouraging developing countries from considerably upgrading their production. However, with the coming transformation of the Chinese economy from export-led to consumption-led growth, EME might see a more significant role for China as a major importer for goods and services in the near future. Lee et al. (2017) show that economies that have a small share of consumption goods in their exports to China might suffer a significant

decrease in their exports to China. At the same time, China's transformation also creates valuable opportunities for countries that satisfy growing consumption demands of the Chinese population. Similarly, Park and Shin (2011: 160) indicate that China becomes "more of consumer and less of an assembler", which heralds the potential of higher exports to China, as a new source of growth, in the near future for the developing world. In addition, China is becoming a more important producer of sophisticated goods with higher labour costs and an aging labour force, leaving some opportunities for other developing economies to materialize their potentials, either by replacing China or being a part of the production chain led by China. The recent trade war and Coronavirus pandemic show that the latter strategy is very risky.

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Appendix Table A1: Break locations by country

Countries	Y		EX_{CHN}		IM_{CHN}		EX_{EME}		IM_{EME}		EX_{AdE}		IM_{AdE}	
	Break 1	Break 2	Break 1	Break 2	Break 1	Break 2	Break 1	Break 2	Break 1	Break 2	Break 1	Break 2	Break 1	Break 2
Argentina	2002Q2	2012Q1	X	X	2002Q2	2003Q1	2008Q1	2009Q1	2002Q2	2005Q2	2008Q3	2009Q2	2002Q3	2004Q1
Bolivia	2004Q4	2008Q4	2003Q2	2008Q1	X	X	2008Q3	2012Q3	2002Q4	2008Q3	2002Q2	2014Q1	2004Q3	2014Q2
Brazil	2002Q4	2008Q3	2003Q1	2005Q1	X	X	X	X	2005Q3	2014Q2	X	X	2002Q3	2007Q3
Chile	2010Q1	X	2003Q1	2005Q1	2002Q3	2009Q3	X	X	X	X	2005Q3	2009Q4	X	X
Costa Rica	X	X	2003Q1	2003Q4	X	X	2008Q3	X	X	X	2008Q3	2009Q3	2002Q4	2009Q1
Croatia	X	X	2003Q3	2005Q1	2002Q2	2013Q2	X	X	X	X	2006Q1	2011Q4	2003Q2	2013Q2
Georgia	2007Q2	2009Q3	2003Q1	2003Q4	2003Q3	2008Q2	X	X	2008Q2	2008Q2	2008Q3	X	2002Q4	2009Q1
Hungary	2005Q3	2012Q4	2003Q2	2006Q4	X	X	2006Q4	2014Q2	2004Q2	2012Q4	2004Q4	2008Q3	2003Q1	2012Q1
India	2003Q4	2009Q1	2003Q1	2005Q2	X	X	2004Q1	2011Q1	2005Q1	2005Q4	2004Q1	X	2012Q1	X
Indonesia	2008Q1	2008Q4	2003Q1	2005Q2	2007Q1	2009Q3	2008Q3	2009Q4	2005Q3	2012Q1	2003Q1	X	2003Q1	2007Q4
Malaysia	2005Q1	2009Q1	2003Q1	2005Q2	X	X	X	X	X	X	2008Q3	2010Q3	2008Q1	2009Q1
Mexico	2002Q2	2008Q4	2003Q1	2005Q2	X	X	2003Q1	X	2007Q3	2008Q3	2008Q3	2010Q3	X	X
Peru	X	X	2002Q3	2003Q2	2004Q4	2010Q1	X	X	2003Q1	2004Q4	2003Q4	2012Q1	2004Q4	2010Q4
Philippines	2008Q2	2010Q4	2003Q1	2009Q2	2004Q4	2008Q4	X	X	X	X	2009Q1	2011Q2	X	X
Poland	2006Q3	2008Q4	2002Q2	2003Q2	2003Q4	2004Q3	X	X	X	X	X	X	X	X
Romania	2008Q2	2011Q4	2003Q3	2005Q4	2006Q4	2013Q1	2002Q3	2008Q2	X	X	X	X	X	X
Russia	2008Q3	2014Q1	2003Q4	2010Q4	2002Q3	X	2008Q4	2011Q4	X	X	2004Q2	X	2009Q1	2014Q2
Saudi Arabia	2009Q4	2010Q4	2002Q3	2003Q2	2004Q1	2008Q3	X	X	X	X	2008Q4	2012Q2	X	X
South Africa	X	X	2003Q1	2005Q1	2008Q3	2009Q2	2007Q4	2009Q4	2007Q3	2008Q2	2003Q3	2014Q1	2007Q2	2008Q1
Thailand	2011Q3	2012Q2	2003Q1	2004Q1	2002Q4	2008Q2	2008Q2	2011Q3	X	X	2008Q3	2011Q3	2003Q1	X
Turkey	2008Q1	X	2004Q1	2010Q1	2002Q2	2006Q3	2009Q1	2012Q3	2004Q1	2012Q4	X	X	2008Q3	X
Ukraine	2003Q3	2013Q3	2003Q2	2008Q2	2008Q4	2013Q1	2007Q3	2008Q3	2013Q2	2014Q2	2008Q2	2009Q2	X	X