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

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Abstract
This study investigates the impacts of trade with China on the gross domestic product (GDP) of the global South. 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, our models take these features into account. The empirical results of 22 major developing countries over 2000Q1 to 2016Q4 find positive contributions of imports from China to GDP in our studied sample, although the magnitude of these effects is smaller than that of other emerging and developing economies (not including China) (EDE) and advanced economies (AdE). The authors also show that, in contrast with considerable impacts of exports to EDE and AdE, exports to China have limited effects on the growth of its partners. However, the recent financial crisis marks a turning point of China's role as a major driver of growth in the South. Namely, while contributions of trade with China in its partners after the global crisis are on the rise, the opposite is true for EDE and AdE. Examining the effects by individual countries, they present that the distance between China and its partners and economic development level of its partners are almost irrelevant to the contributions of imports from China to its partners' growth. They provide some important policy recommendations for the global South from these findings.

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Keywords China; growth; developing and emerging economies; international trade; panel data; econometrics; cross-sectional dependence

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A new hegemon. The Chinese century is well under way
Many trends that appear global are in fact mostly Chinese
The Economist (2018)

1 Introduction

Many scholars in international relations believe that the years 2000s marked one of the most spectacular transformation in the globe: China became a driving force of major global changes (The Economist 2018). The dramatic rise of China versus the gradual fall of traditional powers in recent decades has important economic implications for the developing world. The magnitude of China's presence 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 progress of 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 countries, a rising China brings not only valuable opportunities but also challenges for economic growth in the South. Since the last decade China became a new destination for raw materials and intermediate goods from developing countries. In addition to this, China might provide cheaper inputs for production and cheaper goods for consumers in its partner countries. However, Chinese goods might intensify competition pressure for local producers. This paper aims to investigate the contributions of trade with China compared to trade with other country groups to economic output in the developing world.

Our paper contributes to the literature on the benefits of trade by destination for the global South. Firstly, we focus on impacts of trade by partner on growth (so-called growth-by-destination, Mullings and Mahabir (2018), for more clarity, we call it "growth-by-(trade) destination"), namely, trade with China, AdE and EDE. Due to particular features of China's rise and its economic significance, trade with China would have typical impacts on growth compared to trade with other partners. Secondly, we apply time series econometrics, which has been used rarely in growth-by-(trade) destination literature. This might be due to the limited data availability. Some previous studies with the same topics ignore the non-stationarity, heterogeneity, cross-sectional dependence and structural breaks characteristics of macro panel data, which might lead to wrong statistical inference. Thirdly, we investigate the changing role of trade by partners, especially China, on output over the financial crisis. We investigate whether the severe recession, which originates from the West and affects the West most, might strengthen the position of China in the global economy. Fourthly, our analysis covers as many major developing economies as possible. This could provide a more comprehensive view on the impacts of rising China in the global South. Finally, we examine the role of geographical location and economic development level of the partner countries in taking advantages of imports from China.

Our paper consists of five sections. Following this section, section 2 reviews the relevant literature. Section 3 and Section 4 presents our model specification, 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. Firstly, 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. Secondly, while the major trade partners in the world like the United States 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 take advantage of the economies of scale for domestic production, enhancing the competitiveness of firms and increasing productivity. Second, revenue from exports is a source of investment and government budget, which might help stimulate output growth. Third, exports promote specialization and efficient resource allocation. Fourth, exports accelerate the technology, innovation and knowledge diffusion and transfer through integrating deeper into the international production chains (Feder 1982; for a short review: Awokuse 2005; 2008).

Empirical studies show inconsistent evidence on the 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. Siliverstovs and Herzer (2006) present Granger causal relationship from total export to the net-of-exports GDP, finding no support for the Granger causality from primary export using yearly data from Chile. On the contrary, some evidence shows 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 held when shares of manufactured exports make up a certain threshold. In a similar pattern, Riezman et al. (1996) show that the export-led growth hypothesis is proven in some countries only given 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, through different channels, the positive impacts of imports on output growth can be illustrated by several sound arguments. Similar to exports, by involving in the global production networks, imports promote the transfer of technology and knowledge. 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 gains stronger support. Using annual data from 1964 to 2004, Herrerias and Orts (2011; 2013) indicate that imports are an engine of growth in China mainly by allowing the countries to approach 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 negates the 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 from1960 to 1985, provides empirical support for his theory.

Some studies shows 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 regarding the contributions to growth. Lawrence and Weinstein (2001) prove that imports are an important source of productivity growth in Japan, because imports encourage innovation in the country by pressing 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 the technology absorptive capacity, productivity, and finally growth of the domestic economy. One strand of the literature shows that the developing countries would benefit more from the North-South tie than China-South relations, because the large gap of technological development between North and South might result in higher technology spillovers. Moreover, higher entry barriers among the Southern countries and their weak institutions might hinder economic exchanges among them, resulting in more difficulties and higher costs for the bilateral trade (for a review, see Dahi and Demir 2017).

On the contrary, there are some arguments against this line of theory, namely, two countries with similar technological levels will strengthen technology spillovers because the importers might find it easier to adapt and deploy the technology (for a review, see Dahi and Demir 2017). Therefore, economic relations with China would lead to more positive effects on progress in developing countries than with the economic relations with Western countries. This might be mainly due to the similar technology, and similar consumer preferences in China and other developing countries (Bastos et al. 2018). Another reflection of the higher benefits of China-developing countries over the North-developing countries trade linkages is the imbalances in the North-South trade agreements that favour the Northern partners rather than developing countries. More specifically, developing countries have smaller resources and less bargaining powers in economic negotiations, arrangements and disputes with the Northern partners. China and other emerging economies provide an alternative for the developing countries, which want to get less uneven benefits from trade, investment, and have stronger power and policy space in managing their economies (Dahi and Demir 2017). Carril-Caccia and Milgram-Baleix (2018) provide a comprehensive review on motivation and consequences of investment from major emerging economics, especially China. Similarly, also showing a focus on China, Dahi and Demir (2017) present a comparative study between trade and investment integration with the North and the South.

Considering the emergence of China as a relatively new phenomenon, 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 on the importance of China as an independent source of growth in its neighbouring East and Southeast Asian countries. Differently, 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). Namely, after Japan, China is a leading importer of parts and components (mostly of electrics and electronics products) and the biggest exporters of the finished goods. This makes China become an export hub of the Asian region and contribute to growth of its partners. However, Shafaeddin (2010) also points out some short and medium-run risks (relevant to business cycle in China and markets of 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 one 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 countries with rich resources or being landlocked. But their findings are not robust in models accounting for endogeneity. Trade openness with the United States, 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) compare impacts of trade openness with China and trade openness with European Union, the United States (U.S.) 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 industrial 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 U.S. demand to 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 are as important as that of the U.S. 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 U.S., 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 U.S.

By using fixed effects[2], first differences and GMM (generalized method of moments) 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 with the prolonged recession spreading over the (major) world economies (like global financial crisis, European debt crisis). Thus, structural breaks might occur in our times series and require special

[2] 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

econometric treatment. Moreover, the economic recession during this period might change the role of the major economic powers on promoting growth in the rest of the world. Therefore, we investigate the impacts of both export and import on GDP in 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 the global economic crisis.

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 as 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. 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 to handle with the mixed frequency of the data, the MIDAS approach (Ghysels et al. 2006) cannot incorporate fully all the time series properties as the Common Correlated Effects (CCE) estimator and its varieties can. Moreover, converting data from low frequency to high frequency is often criticized because of its unrealistic assumptions.

3.1 Data Description

Our balanced panel data set includes 22 EDE[3] 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 when China became a real power in international trade, which is characterized by its share of international trade soaring 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

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

specific group (AdE or EDE) is the total value of trade with all countries in that group. The total trade value with AdE, EDE 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, 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[4].

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 about here/

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 financial crises. The upward trends also change their patterns after 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 countries or common for the whole sample) might lead to false statistical inference.

[4] 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*), *EDE* and *AdE*:

$$Y_{it}=\alpha_{EX,ki}' + \beta_{EX,ki}' EX_{kit} + \mu_{EX,kit} \text{ with } \mu_{EX,kit}=\theta_{EX,ki}' F_{EX,kt} + \upsilon_{EX,kit} \quad (1)$$

$$Y_{it}=\alpha_{IM,ki}' + \beta_{IM,ki}' IM_{kit} + \mu_{IM,kit} \text{ with } \mu_{IM,kit}=\theta_{IM,ki}' F_{IM,kt} + \upsilon_{IM,kit} \quad (2)$$

in this setup, α_{ki} and β_{ki} indicate the heterogeneous effects of variables of interest, μ is an error term that consists of unobserved common factors F_t with factor loading θ_i and an unobserved country-specific effect υ_{it}.

Different from the heterogeneous models, the traditional approach in research on growth-by-(trade) destination literature use pooled or fixed-effect 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 macroeconomic 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 Common Correlated Effects (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 average of the variables into the initial equation, as follows:

$$Y_{it}=\alpha_{EX,ki}' + \beta_{EX,ki}' EX_{kit} + £_k'\overline{Y_t} + \Phi_{EX,k}'\overline{EX_{kt}} + \mu_{EX,kit} \qquad (3)$$

$$Y_{it}=\alpha_{IM,ki}' + \beta_{IM,ki}' IM_{kit} + £_k'\overline{Y_t} + \Phi_{IM,k}'\overline{EX_{kt}} + \mu_{IM,kit} \qquad (4)$$

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. (2015) 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 first the nature of our macro panel data in terms of cross-sectional dependence, non-stationarity and structural breaks. If one of these symptoms exists, 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 relationshp (Φ) and the presence of the long-run equilibrium relations (ρ, ρ=0 indicates no cointegration) between trade and GDP.

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

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

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

$$\Delta Y_{it}=\lambda_{EX,ki}{}' + \lambda_{EC,ki}{}' Y_{ki,t-1} + \lambda_{EX,ki}{}' EX_{ki,t-1} + \lambda_{EX,F,ki}{}' F_{EX,k,t-1} + \lambda_{D,EX,ki}{}' \Delta EX_{kit} + \lambda_{F,ki}{}' \Delta F_{kt} + \varepsilon_{kit} \quad (7)$$

$$\Delta Y_{it}=\lambda_{IM,ki}{}' + \lambda_{EC,ki}{}' Y_{ki,t-1} + \lambda_{IM,ki}{}' IM_{ki,t-1} + \lambda_{IM,F,ki}{}' F_{IM,k,t-1} + \lambda_{D,IM,ki}{}' \Delta IM_{kit} + \lambda_{F,ki}{}' \Delta F_{kt} + \varepsilon_{kit} \quad (8)$$

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-section averages of variables in the spirit of Chudik and Pesaran (2016), 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:

$$\Delta Y_{it} = \lambda_{EX,ki}{}' + \lambda_i^{EC\prime} Y_{i,t-1} + \lambda_{ki}^{EX\prime} EX_{ki,t-1} + \lambda_{ki}^{D.EX\prime} \Delta EX_{kit} + \lambda^{Y.CA\prime} \bar{Y}_{t-1} + \lambda_k^{EX.CA\prime} \overline{EX}_{k,t-1} + \lambda^{D.Y.CA\prime} \overline{\Delta Y}_t + \lambda_k^{D.EX.CA\prime} \overline{\Delta EX}_{kt} + \sum_{l=1}^{p} \lambda_{k,l}^{D.EX.CA\prime} \overline{\Delta EX}_{k,t-l} + \sum_{l=1}^{p} \lambda_l^{D.Y.CA\prime} \overline{\Delta Y}_{t-l} + \varepsilon_{EX,kit} \quad (9)$$

$$\Delta Y_{it} = \lambda_{IM,ki}{}' + \lambda_i^{EC}{}' Y_{i,t-1} + \lambda_{ki}^{IM}{}' IM_{ki,t-1} + \lambda_{ki}^{D.IM}{}' \Delta IM_{kit} + \lambda^{Y.CA}{}' \bar{Y}_{t-1} + \lambda_k^{IM.CA}{}' \overline{IM}_{k,t-1} +$$

$$\lambda^{D.Y.CA}{}' \overline{\Delta Y}_t + \lambda_k^{D.IM.CA}{}' \overline{\Delta IM}_{kt} + \sum_{l=1}^{p} \lambda_{k,l}^{D.IM.CA}{}' \overline{\Delta IM}_{k,t-l} + \sum_{l=1}^{p} \lambda_l^{D.Y.CA}{}' \overline{\Delta Y}_{t-l} + \varepsilon_{IM,kit} \qquad (10)$$

Chudik and Pesaran (2015) show that the Dynamic Common Correlated Effects Mean Group (DCCEMG) 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 RMSE criteria. In contrast, as indicated in Pesaran and Chudik (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 spillover effects between countries or regions (Eberhardt and Teal 2011). Ignoring cross-sectional dependence can cause misleading inference and inconsistency (Pesaran 2015b).

/Table 1 about here/

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 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.

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 inference (Hlouskouva and Wagner 2006). 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.

/Table 2 about here/

While the Pesaran (2007) approach is to augment the cross-sectional average, 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).

/Table 3 about here/

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 distortion. 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.

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, Lee and Tieslau (2010) and Lee and Tieslau (2019).

/Table 4 about here/

This test is based on the LM unit root test and is implemented by the procedure introduced in Im, Lee and Tieslau (2010). Namely, using the "maximum F test" developed in Lee and Strazicich (2009) and Lee et al. (2012), we first 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 (2007) approach. Table 4 presents the tests allowing for time fixed effects. The inclusion of time effect across the panel helps to reduce the impact of error correlation.

Findings from panel CA-LM unit root test show that the null hypothesis of unit root is rejected for EX_{CHN} and IM_{AdE} while all other time series might be nonstationary if panel unit root test accommodates both cross-correlation and heterogeneous structural breaks. The detected break locations determined by the Im, Lee and Tieslau (2010) and Lee and Tieslau (2019) procedures are reasonable. Namely, financial crisis periods (2008-2009) witness the most often breaks in the examined countries. Table 5 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 6 shows that the 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.

/Table 6 about here/

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 the typical features of macro panel in growth empirics as reviewed by Eberhardt and Teal (2011; 2012): cross-sectional dependence, non-stationarity, breaks and possible cointegration. We employ the Common Correlated Effects (CCE) estimator developed by Pesaran (2007), which accommodates all of these features and is appropriate for growth regression models (Eberhardt and Teal (2011; 2012)).

/Table 7 about here/

The findings from the CCE-MG estimation 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 EDE (around 0.16%, 0.08% and 0.05%, repectively) and AdE (0.18%, 0.12% and 0.1%). While exports to EDE and AdE both enhance growth, exports to China contribute insignificantly to the GDP level of the countries in our sample.

/Table 8 about here/

The findings from the DCCE-MG approach at different lags (Table 8) are consistent with that of CCE estimator: contributions of imports from China are significant, but lower than that of EDE and AdE; and, in contrast to exports to EDE 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 long-run effects of imports on GDP increase are two times higher than the short-run effects. Different from the static models, the dynamic models indicate that exports to China or EDE both are unimportant to growth in long-term although exports to EDE still have some impacts in short-term. The significant and negative EC coefficient terms in all specifications of Table 8 (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, nonstationarity, cointegration and structural break, seems to overestimate 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.

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 make the impacts of China on growth less visible or not will be investigated in the next parts (Section 4.3).

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 recent financial turbulence by analyzing the 2008Q1-2016Q4 period separately.

The findings of Tables 7 and 8 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 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 EDE are 0.076% for post-crisis and 0.097% for the whole period in CCE-MG model, respectively (0.047% and 0.062% for AMG models). 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 EDE and AdE, both in short and long terms, contribute lower to growth in post-crisis period in almost all specifications. The global financial crisis can be seen as a turning point for China's increasing role in driving the growth in the developing world.

On the contrary, 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.

/Figure 2 about here/

4.3 Negligible Roles of the Geographical Location and Economic Development Level

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. This might be because the influences of rising China are very large now, covering almost all countries and regions. 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 might show that the trade links with China affect the growth of the global South in very homogenous ways. Further research might examine, if not geographical distance or development level, which features of partner countries determine the positive effects of their trade with China.

/Figures 2, 3 about here/

4.4 Sensitivity Analysis: Models with Labor and Capital Controls

As a robustness check, Table 9 presents the main results when we add capita 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 7 and 8 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 labor and capital controls (Tables 7, 8), 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 labor and capital on output fluctuations at quarterly frequency.

/Table 9 about here/

5 Conclusions

Our article quantifies the impacts of exports to and imports from China on GDP in major developing economies. We find the positive contributions of imports from China to GDP, although such positive contributions are still lower than that of EDE and AdE. However, impacts of China on growth becomes much more significant since the financial crisis while EDE 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 scholars on China as a new and benign hegemon on the horizon. The developing world's growth is increasingly dependent on Chinese goods. 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 another hand, ensuring the competitiveness of the domestic production in longer-run.

Our analysis shows the 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 not create opportunities for developing countries to upgrade considerably its production. However, with the coming transformation of the Chinese economy from export-led to consumption-led growth, EDE might see a more significant role of 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 coming time for the developing world. In addition, China is becoming a more important producer of sophisticated goods with higher labor costs and an aging labor 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.

Acknowledgements:

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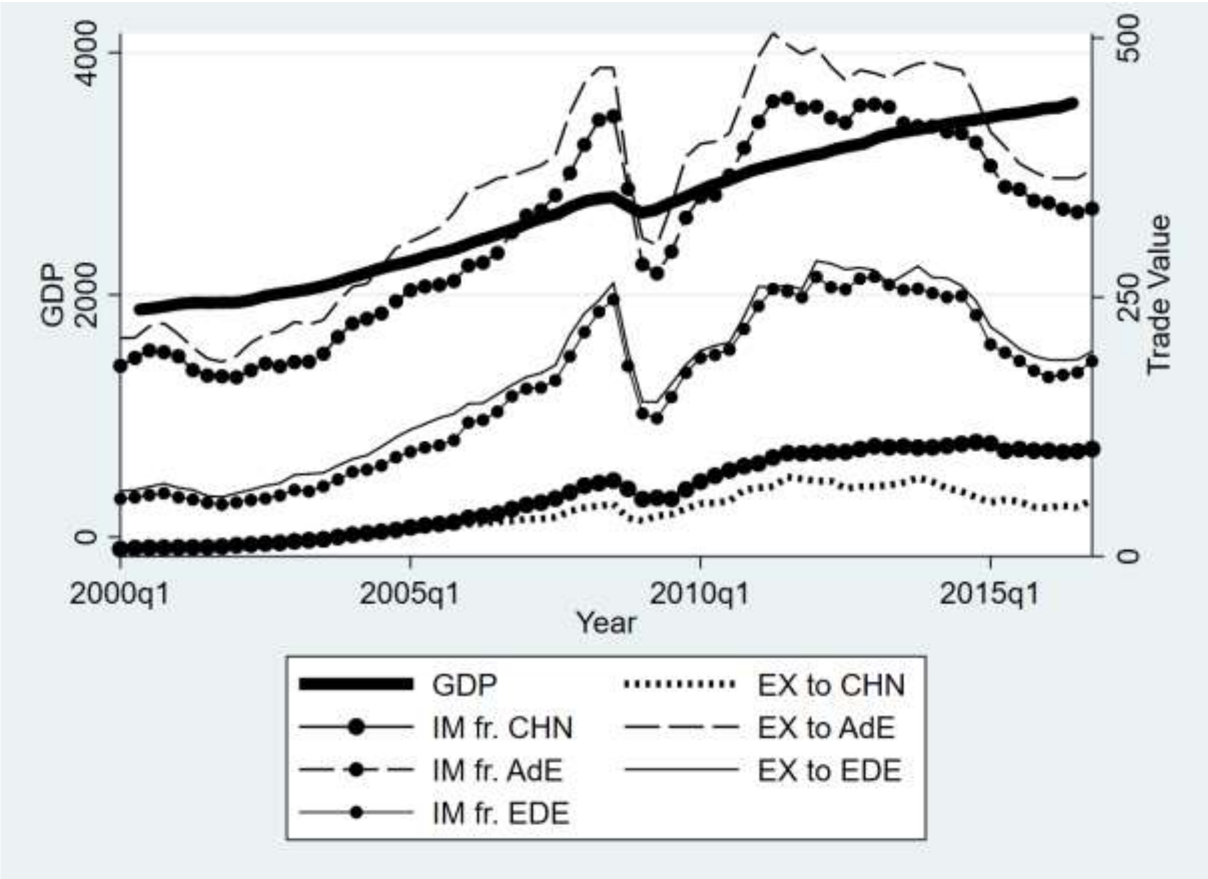
https://www.economist.com/graphic-detail/2018/10/27/the-chinese-century-is-well-under-way

Figure 1: Total GDP and Trade Volume by Partners in 22 EDE (at constant 2010 price, in billion US$)



Source: IMF and authors' calculations

Table 1: Cross-Sectional Dependence Tests for Variable and Residuals

	Variable			Residual			
	Pesaran (2004) CD test			Breusch-Pagan LM test		Pesaran's 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_{EDE}	115.58	0.000	0.92	4996.65	0.000	45.68	0.000
IM_{EDE}	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.

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_{EDE}	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_{EDE}	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.

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_{EDE}	Test Statistics	1.514	-0.67	-0.63	-0.51
	p-value	0.974	0.251	0.265	0.305
IM_{EDE}	Test Statistics	0.973	-1.134	-1.01	-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	0.32
	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, 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.

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_{EDE}	-0.715	2008-2009	10	13
IM_{EDE}	-0.298	2002-2003; 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.

Table 5: 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	2003Q4	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	X	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

Table 6: 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.

Table 7: 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)	(0.0096)	(0.009)	(0.0098)	(0.0070)	(0.007)	(0.0115)
CD test	13.15	12.99	6.94	-3.18	-3.11	-2.8	-3.43	-3.43	-2.12
RMSE	0.087	0.087	0.063	0.026	0.024	0.014	0.03	0.028	0.018
IM_{CHN}	0.11***	0.11***	0.154***	0.074***	0.074***	0.071***	0.048***	0.05***	0.055***
	(0.012)	(0.012)	(0.016)	(0.0124)	(0.0122)	(0.0129)	(0.0123)	(0.012)	(0.0143)
CD test	4.02	3.63	6.21	-4.26	-4.23	-3.67	0.18	0.33	-2.16
RMSE	0.07	0.07	0.049	0.02	0.019	0.013	0.024	0.022	0.016
EX_{EME}	0.11***	0.11***	0.122***	0.088**	0.089**	0.058***	0.038**	0.036*	0.028
	(0.0358)	(0.036)	(0.0392)	(0.0382)	(0.0363)	(0.0197)	(0.0196)	(0.0184)	(0.0229)
CD test	-2.407	-2.408	2.931	-1.99	-1.88	-3.02	-2.82	-2.6	-3.2
RMSE	0.08	0.08	0.058	0.023	0.021	0.0125	0.027	0.025	0.0158
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)	(0.0168)
CD test	8.66	8.63	6.81	-1.21	-1.7	-3.18	-1.05	-1.59	-3.04
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**
	(0.0363)	(0.0365)	(0.037)	(0.0249)	(0.026)	(0.0230)	(0.0188)	(0.019)	(0.0230)
CD test	-2.5	-2.52	0.713	-4.42	-4.5	-2.97	0.87	0.78	-1.69
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***
	(0.0326)	(0.0326)	(0.032)	(0.0231)	(0.0231)	(0 .0146)	(0.0156)	(0.0148)	(0 .0154)
CD test	1.81	1.748	6.143	-2.58	-2.86	-3.42	-0.92	-1.09	-1.82
RMSE	0.074	0.071	0.054	0.020	0.019	0.012	0.0233	0.0222	0.0156

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 8: Dynamic Models

	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	0.4297	0.0605	-0.0025	-0.0035	-0.0035	-0.003	0.0043	-0.0051
	(0.6138)	(0.0418)	(0.0094)	(0.0119)	(0.0092)	(0.0107)	(0.0071)	(0.0077)
SR	0.0028*	0.0034	0.0059	0.0081	0.005	0.0077	0.0066	0.0064
	(0.0016)	(0.0027)	(0.0053)	(0.0091)	(0.005)	(0.008)	(0.0052)	(0.0091)
EC coefficient Y(t-1)	-0.00476	-0.0375***	-0.2161***	-0.4434***	-0.2164***	-0.4556***	-0.2625***	-0.487***
	(0.0064)	(0.0096)	(0.0386)	(0.0544)	(0.0394)	(0.0527)	(0.0454)	(0.0583)
CD test	26.68	23.45	-3.1	-1.84	-3.02	-1.85	-3.08	-2.06
RMSE	0.0158	0.0157	0.0111	0.0092	0.0106	0.0084	0.0096	0.0077
IM_{CHN}								
LRA	0.028	0.14***	0.06***	0 .0823***	0.0575***	0.09**	0.053***	0.0954***
	(0.2406)	(0.0415)	(0.0156)	(0.0272)	(0.0170)	(0.0347)	(0 .0156)	(0.033)
SR	0.0441***	0.0482***	0 .0296***	0.0407***	0.0295***	0 .0390***	0.0294***	0.0421***
	(0.0084)	(0.0153)	(0.0073)	(0.013)	(0.0075)	(0.0149)	(0.0075)	(0.0167)
EC coefficient Y(t-1)	-0.0064	-0.0525***	-0.292***	-0.4625***	-0.3114***	-0.4727***	-0.3517***	-0.5411***
	(0.0088)	(0.0142)	(0.0394)	(0.0512)	(0.0452)	(0.0576)	(0.0451)	(0.054)
CD test	17.27	Nov 57	-3.4	-2.32	-3.49	-1.73	-3.54	-1.99
RMSE	0.0149	0.0147	0.011	0.0087	0.010	0.008	0.009	0.007
EX_{EME}								
LRA	0.303	0.249***	0 .032	0.03	0.031	0.027	0 .02507	0.011
	(0.2635)	(0.041)	(0.041)	(0.033)	(0.041)	(0.0302)	(0.0306)	(0.032)
SR	0 .0527***	0.061***	0.034***	0.046**	0.034***	0.0464**	0.0129***	0.0402*
	(0.0101)	(0.014)	(0.012)	(0.0202)	(0.012)	(0.02)	(0.0368)	(0.0209)
EC coefficient Y(t-1)	-0.007	-0.044***	-0.208***	-0.444***	-0.214***	-0.489***	-0.269***	-0.549***
	(0.0065)	(0.0109)	(0.0358)	(0.049)	(0.0367)	80.0456)	(0.0397)	(0.0543)
CD test	11. Mai	7.188	-3.88	-2.28	-3.69	-2.18	-3.18	-2.41
RMSE	0.015	0.0145	0.011	0.0084	0.011	0.0076	0.0093	0.0068
IM_{EME}								
LRA	0.242***	0.191***	0.0879***	0.0802***	0.0859***	0.0662**	0.0699***	0.0826***
	(0.0846)	(0.0407)	(0.027)	(0.0277)	(0.028)	(0.0279)	(0.0216)	(0.031)
SR	0.0587***	0.0677***	0.0349***	0.0291***	0.033***	0.0313***	0.03***	0.0354***
	(0.0105)	(0.0105)	(0.0101)	(0.0098)	(0.0095)	(0.0106)	(0.0085)	(0.011)
EC coefficient Y(t-1)	-0.0121	-0.0455***	-0.25***	-0.4648***	-0.2582***	-0.4936***	-0.3064***	-0.5428***
	(0.0084)	(0.0132)	(0.0389)	(0.051)	(0.0408)	(0.0465)	(0.0409)	80.0507)
CD test	9.051	4.157	-3.97	-2.23	-3.9	-2.2	-3.66	-2.34
RMSE	0.0147	0.014	0.0106	0.009	0.0103	0.008	0.0092	0.0074
EX_{AdE}								
LRA	0.544	0.3197***	0.0886**	0.0966***	0.0928**	0.1039***	0.0953***	0.1155***
	(0.3698)	(0.0584)	(0.0368)	(0.0337)	(0.0365)	(0.0365)	(0.0253)	(0.0367)

SR	0.0571***	0.0609***	0.0392***	0.0535***	0.0403***	0.0555***	0.0416***	0.0625***
	(0.0137)	(0.0189)	(0.0095)	(0.0162)	(0.00935)	(0.0164)	(0.0097)	(0.0177)
EC coefficient Y(t-1)	-0.0086	-0.0431***	-0.2346***	-0.4024***	-0.236***	-0.4330	-0.2816***	-0.4431***
	(0.0075)	(0.0101)	(0.037)	(0.0521)	(0.0372)	(0.0539)	(0.0369)	(0.0668)
CD test	12.546	8.821	-4.03	-1.73	-3.83	-1.78	-3.52	-1.96
RMSE	0.0151	0.0147	0.0109	0.0090	0.0105	0.0081	0.0093	0.0072
IM_{AdE}								
LRA	-2.6868	0.2321***	0.1326***	0.1166***	0.1261***	0.098***	0.0964***	0.0979***
	(35.1226)	(0.0575)	(0.0261)	(0.028)	(0.0249)	(0.026)	(0.0188)	(0.0286)
SR	0.0743***	0.086***	0.051***	0.0481***	0.0492***	0.0431***	0.0414***	0.0419***
	(0.01168)	(0.012)	(0.0108)	(0.0122)	(0.01)	(0.0118)	(0.0083)	(0.0133)
EC coefficient Y(t-1)	-0.0006	-0.0375***	-0.2924***	-0.5143***	-0.2909***	-0.5141***	-0.3405***	-0.5958***
	(0.0068)	(0.0105)	(0.0406)	(0.0504)	(0.0408)	(0.0567)	(0.0407)	(0.0533)
CD test	9.005	4.168	-3.64	-1.59	-3.54	-1.24	-3.7	-1.93
RMSE	0.0145	0.014	0.0105	0.0089	0.0102	0.0082	0.0093	0.0075

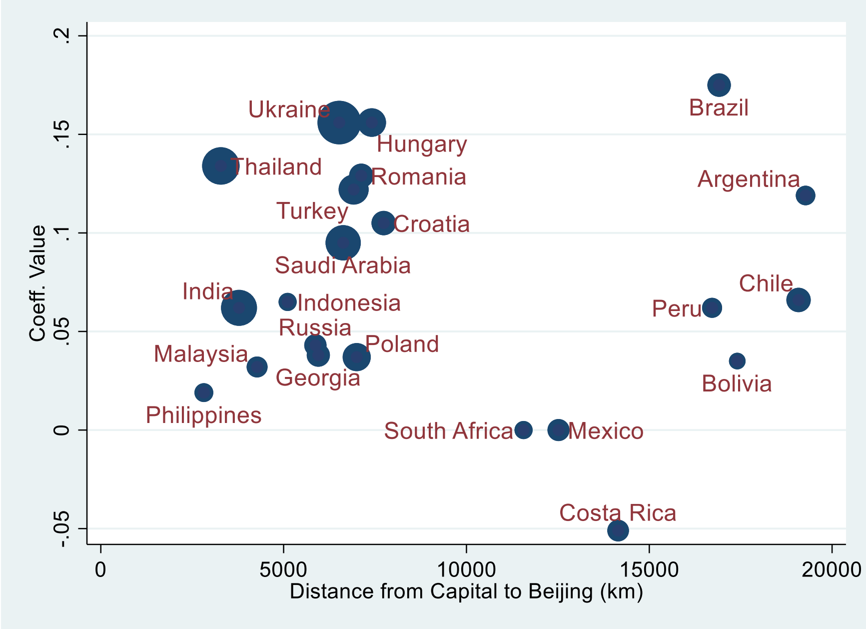
Note: The numbers in brackets are standard errors (robust for FE, for MG and AMG, the variance is simply the variance of the unit specific coefficients, thus it cannot be robust); *, ** and ***, indicate significance at the 10%, 5% and 1% levels, respectively. All models include trend. We use xtmg command 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}, EX_{EME}, IM_{EME}, EX_{AdE}, IM_{AdE} indicate natural log of exports, imports to China, EME and AdE, respectively.

Table 9: Sensitivity Analysis with Labor can Capital as Additional Control Variables

Static model	CCE-MG		CCE-MG		CCE-MG		CCE-MG		CCE-MG		CCE-MG	
	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008
Dependent Variable: Y	EX_{CHN}		IM_{CHN}		EX_{EME}		IM_{EME}		EX_{AdE}		IM_{AdE}	
EX/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	DCCE-MG-1 lag		DCCE-MG-1 lag		DCCE-MG-1 lag		DCCE-MG-1 lag		DCCE-MG-1 lag		DCCE-MG-1 lag	
	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008	Full	After 2008
Dependent Variable: D.Y	EX_{CHN}		IM_{CHN}		EX_{EME}		IM_{EME}		EX_{AdE}		IM_{AdE}	
LRA(EX/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/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

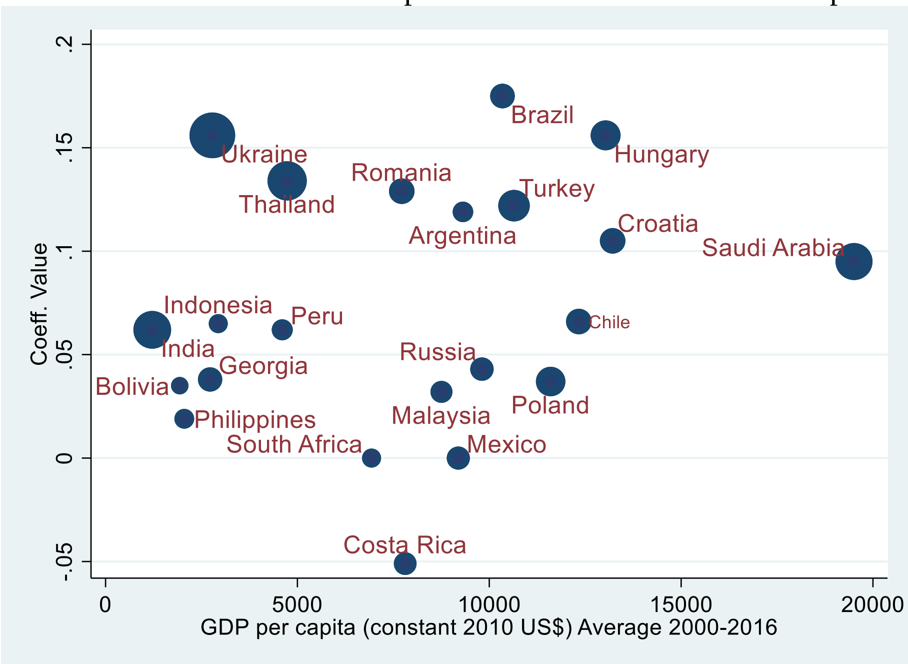
Note: similar Tables 7,8.

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



Note: Coefficient value extracted for individual countries in the sample from static specification in Table 7 (to save space, we do not present the graph drawn from coefficient value from dynamic specification in Table 8, 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.

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



Note: Coefficient value extracted for individual countries in the sample from static specification in Table 7 (to save space, we do not present the graph drawn from coefficient values from dynamic specification in Table 8, which also shows a weak correlation between the two variables). GDP data is from World Bank. The size of circle presents standard errors.