

WORKING PAPER

Mirroring China's development on CEE countries' GDP and labour productivity

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Abstract

In terms of economic evolution, we consider that the perception of a country's development could be assessed on the basis of the impact on the progress of other countries. In addition to this, we hypothesize that the economic development of a certain country could be determined by using enhanced outflows of direct investments and substantial bilateral trade relations as proxies. Starting from this set of hypotheses, we conduct an empirical analysis aiming at capturing the impact of Chinese development in the last 10 years on the Central and Eastern European countries. We employ a panel data approach and Granger causality tests that allow for the investigation of the impact of Chinese FDI and trade on the GDP and labour productivity of CEE countries for the 2005-2015 period.

We build several panel data models for the purpose of obtaining balanced data and robust results. Our approach is divided into two phases: we firstly evaluate the general impact of FDI and foreign trade on the GDP growth of the CEE countries. Secondly, we assess the impact of both Chinese outward FDI and the foreign flows of goods and services in these countries. This approach allows us to compare the magnitude of the impact of Chinese development on the selected CEE countries. We use a multivariate Granger-causality test in order to test if exports and FDI Granger-cause the economic growth of the CEE countries.

Our results point to a positive and significant impact of Chinese FDI and foreign trade in the CEE countries, depending on the specifications of each model. Given the increased involvement of China in the CEE region, the impact of the Chinese investments and foreign trade will potentially improve in the near future and depends on the capacity and willingness of each country to capitalize on such opportunities.

Keywords: *China development, Central and Eastern Europe, FDI, productivity, panel data, Granger causality*

1. Introduction

China's spectacular economic expansion in the past few years made the subject of numerous academic studies and debates, as it is one of "the most important transformative processes of our time" (Kaplinsky and Messner, 2008, p. 197), with effects which are not only regional, but also global. Usually, the main channels through which China's impact is evaluated relate to the way in which trade and foreign direct investment flows are affected around the globe: in regional economies (Das, 2007), the American continent (Jenkins et al., 2008), in the developing world (Kaplinsky and Messner, 2008). Recently, with the "16+1" format of cooperation initiated in 2012 for enhancing relationships between China and the Central and Eastern Europe (CEE) countries, China also increased its presence in this region.

Due to the recent established relationship of cooperation, there is a gap in the empirical literature related to the impact of Chinese expansion in this part of the world.

The aim of this paper is to assess the perception of the CEE countries on to China's development in the last years. We start from the assumption that the perception of a country's development could be assessed in terms of the impact on the progress of other countries and we test the impact of Chinese progress on the economic growth of the countries in this region. Our paper is structured as follows: in Section II, we provide brief insights in the literature. Section III presents the hypotheses and the methodology, while Section IV describes the results. We highlight the main conclusions of the study in the last section.

2. Literature review

FDI are generally associated with positive spillovers in the host economy, having a significant impact on the growth of countries with different level of economic development, according to several studies in the literature (Borensztein et al., 1995; Dunning, 1993; Li and Liu, 2005; Pekgas, 2015; Iamsiraroj, 2016; Goh et al., 2017 etc.), being indicated as a healthy source for the economic growth (for details, see Horobet and Popovici, 2017).

Generally, the literature is converging in establishing a positive effect of both FDI and exports on GDP, according to Acarvacı and Ozturk (2012). The same is available for CEE countries, such hypotheses being tested in the studies of Fidrmuc and Martin (2011), Gallova (2012), Zykovic et al. (2014), Dritsaki and Stiakakis (2014) etc. However, the results are usually influenced by the time period under analysis and the sample (see for example Popovici and Calin, 2016; Goh et al., 2017, for Asian countries).

An important spillover of FDI in the host economies is the extent to which labour productivity is affected. Again, although a general positive influence is self-understood, there is no clear-cut evidence following empirical studies. Often, there are other factors (such as the absorptive capacity of domestic firms) that influence the impact of FDI in similar sectors (Holger and Greenaway, 2004). For the CEE countries, Vahter (2004) finds that the presence of FDI spillovers towards labour productivity depends on different factors, such as the type of FDI and the level of economic development of the host country, as a positive relationship between FDI and labour productivity is found for Slovenia, but not for Estonia. Javorcik (2004) provides evidence for productivity spillovers through backward linkages for intra-industry companies in Lithuania.

A similar logic is usually applied to exporting firms, who are seen as more prone to increase their productivity as compared to the non-exporting ones. There are two hypotheses in the literature that explain this outcome: the hypothesis of self-selection (only the more productive companies could perform in the international market) and learning-by-doing (new knowledge and expertise are gain following such activities), according to Wagner (2007) or De Locker (2007). Schwarzer (2017) tests these hypotheses on German firms and supports the increase of productivity, but at different levels, depending on the sector of activity. Deshmukh

and Pyne (2013) find similar relationships for Indian manufacturing companies. Baldwin and Gu (2003) and De Loecker (2007) associate increased productivity with export activities for manufacturing companies in Canada and in Slovenia, while Greenaway and Yu (2004) obtain the same result for UK firms activating in the chemical industry.

In this context, we are interested if FDI flows emanating from China and if trade relationship – which are seen, as previously mentioned, as an attribute of economic development – have an influence on the economic growth and development of CEE countries. While the literature is poor in this direction, studies point to positive spillovers in countries which have a longer cooperation with China. For example, several empirical studies were carried out on the relationship between China and Africa, due to the economic relations that started in 2000. According to these studies, FDI from China generally lead to growth in the African countries, as in Whalley and Weisbrod (2012). Doku et al. (2017) employ a fixed effects panel data approach to test the impact of Chinese FDI on the GDPs of 20 African countries. . The authors conclude that a 1% increase in African FDI stocks coming from China will drive a 0.607% increase in GDP. On the contrary, Zhang et al. (2014) and Busse et al. (2016) find no evidence of a positive impact of FDI from China on African economic growth, which could be the result of an environment that is less able or insufficiently developed to absorb investment flows. Other studies report that the increased capacity of China to attract FDI also leads to rising FDI inflows in neighbouring countries (Das, 2007; Eichengreen and Tong, 2007; Zhou and Lall, 2005).

On the export side, Busse et al. (2016) indicate a positive effect in terms of economic growth for African countries that export natural resources in China. Meyersson et al. (2008) reach the same conclusion for exports in China, while exports to the rest of the world have no effect on the economic growth of African countries. A similar result is found by Balamoune-Lutz (2011). Regarding the effects in the region, Eichengreen et al. (2004) provide evidence on the fact that Chinese growth positively affects the exports of the high-developed neighbouring countries, while it has an adverse effect on the exports of the less developed economies.

There is a gap in the literature for the impact of the Chinese growth in other regions of the world, mostly due to lack of data, therefore, this study could represent a benchmark for further investigations in this area.

3. Methodology

Based on the literature review, the following hypotheses are tested:

Hypothesis 1: Both total and Chinese FDI stocks in the CEE region have a positive and significant impact on economic growth.

Hypothesis 2: The labour productivity of the countries in the CEE region is positively and significantly influenced by the volume of total and Chinese exports and FDI.

Hypothesis 3: The volumes of both total and Chinese FDI stocks and exports lead to growth in the CEE countries.

In terms of methodology, for the testing of the first two hypotheses we use a panel data approach. The empirical analysis includes five countries for which data related to Chinese inward FDI are available, namely: Bulgaria, the Czech Republic, Hungary, Poland and Romania. For the rest of the countries in the 16+1 area, the main obstacle in computing a larger database is the lack of data for FDI. This is also the reason for which the analysis is limited to the 2005-2015 period.

We use the extended version of the neo-classical growth model that includes human capital. The determinants of economic growth are explained starting from the production function. In order to test Hypotheses 1 and the importance of FDI in the economic development of a country, we will start from the Solow growth model, adapted by Mankiw, Romer and Weil (1992) for including human capital, described by the Cobb-Douglas production function presented in Equation 1:

$$Y(t) = K(t)^\alpha H(t)^\beta (A(t)L(t))^{1-\alpha-\beta} \quad (1)$$

where the output (Y) is a function of accumulated capital (K), human capital (H), labour (L) and knowledge (A) at a certain moment of time (t). The parameters α , β are the elasticities for the production factors.

Hlavacek and Bal-Domanska (2016) adapt the model for taking into account FDI inflows in eight CEE countries.

Both the dependent and the independent variables, with their definition and interpretation, are presented in Table 1, also indicating data sources. The main sources are UNCTAD, Eurostat and World Bank databases. For OFDI from China, we used the statistics provided by MOFCOM. Data were seasonal and inflation adjusted. The selection of the independent variables was made in accordance with the growth model, in which we emphasize the role of FDI and exports.

We use the fixed-effect panel approach for testing hypotheses 1 and 2, whose general form is described in equation (2) below:

$$Y_{it} = \alpha + \beta_{it}X_{it} + \delta_{it}Z_{it} + \gamma_{it} + \varepsilon_{it} \quad (2)$$

where Y_{it} is the dependent variable, X_{it} is the k -dimensional vector of independent variables, Z_{it} is a vector of country characteristics, γ_{it} captures the cross-section specific fixed effects, α is the overall constant of the model and ε_{it} is the error terms for $i=1,2,\dots,N$ cross-sectional units observed for periods $t=1,2,\dots,T$. The model is estimated using ordinary least squares. The use of fixed effects panel analysis was decided based on the Hausmann¹ test and the number of variables and observations.

The estimation of the model is based on the panel data methodology for several reasons. Firstly, the panel provides the opportunity for obtaining robust estimation results

¹ The authors can provide the results of the Hausmann test at request.

even in cases where only a scarce number of observations are available, due to its multidimensionality (Baltagi, 2005; Hsiao, 2006; Bruderl, 2005), while the use of other traditional models would be limited. There is the advantage of increased variability and degrees of freedom while diminishing collinearity, which provides higher efficiency, according to Notta and Vlachvei (2008). Secondly, the use of panel data allows for more complex observations on behaviour patterns, which are not easily detectable in cross-sections or time-series data.

Finally, the economic growth of CEE countries will depend on the gross fixed capital formation, exports, FDI, expenditure on education, the qualification level of the population approximated by schooling level and technology capacity, expressed as the number of patents:

$$GDP = f\{GFCF, FDI, EXPORTS, \text{expenditure on education, schooling level, technology capacity}\} \tag{3}$$

For the second hypothesis, we use an equation where labour productivity is dependent on the employment level, the labour costs, FDI, exports, expenditure on education, schooling level:

$$GDPC = \{\text{employment, labour costs, FDI, EXPORTS, expenditure on education, schooling level}\} \tag{4}$$

In both models, our intention is to emphasize the effects of firstly Chinese FDI inflows into CEE countries and secondly CEE countries' exports to China, on GDP and labour productivity. For this purpose we apply in the first stage the panel methodology on data series related to Chinese FDI and exports and in the second stage we test a similar model, this time including the whole volume of FDI and exports for our sample.

For testing the third hypothesis, we use the Granger causality approach in two types of models: the first one is considering the business relationship with China, while the second one provides comparable results by generally taking into account the volume of exports and FDI as a result of the interaction with the rest of the world. The Granger causality framework considers that “x” is a cause of “y” if it could predict the values of “y”, namely if it could provide a more accurate prediction of “y”, based on the “y” past values. We use a multivariate Granger-causality test in order to check if exports and FDI Granger cause the economic growth of the CEE countries. We could deal with three type of results: unidirectional, bidirectional or no Granger-causality.

Table 1. Description of variables

Variable	Description	Measure	Data source
CEXP	Exports to China	Thousand USD	WITS World Bank
CFDI	FDI inflows into the host countries from China	Millions of USD	MOFCOM & UNCTAD
EED	Total public expenditure on education as % of GDP, for all levels of education combined	% of GDP	Eurostat
EMP	Employment to population ratio, 15+	% of total	World Bank
GDP	Total GDP	GDP (current USD)	World Bank
GDPG	GDP per capita	GDP per capita (current US\$)	World Bank
GFCF	Gross fixed capital formation	Current prices, million euro	Eurostat
NULC	Nominal unit labour cost based on hours worked	Index, 2010=100	Eurostat
PATENT	Patent applications, residents	Number	World Bank
SEC	School enrolment, secondary	% gross	World Bank
TER	School enrolment, tertiary	% gross	World Bank
WEXP	Total exports	Thousand USD	WITS World Bank
WFDI	FDI stocks of the host countries from the whole world	USD at current prices in millions	UNCTAD

4. Research Results

Based on the results of the Hausmann test, we applied a panel data methodology with fixed effects for both cross-section and period². We tested the significance of the fixed effects estimates in least squares specifications for all models. The statistic values of the six tests that evaluate the significance of the cross-section and period, together with their associated p-values, reject the nulls that the cross-section effects are redundant, that there are no period effects and of the restricted model in which there is only a single intercept, thus confirming the robustness of the applied methodology.

For the first hypothesis, the results are presented in Table 2. The first part presents the impact of Chinese FDI on the economic growth of the CEE countries, while the second part is destined to checking the role of the whole volume of FDI. We add the independent variables successively for testing the robustness of the model, the significance and the relationship obtained.

The impact of Chinese stocks of FDI in the sample of the CEE countries has a positive and significant impact in the economic growth of these countries, as it can be seen in Table 2. The same is available for the total value of FDI stocks, thus confirming the results in the literature related to the positive impact of FDI on GDP. The result remains robust even when the qualification of the population or the quality of the labour force is taken into account. We could notice that the significance of the dependent variables is similar in both type of models.

² The results could be provided by request.

On the contrary, the expenditure for education has a significant impact only when the percentage of population in different levels of schooling is not taken into account. This could suggest that the qualification of the labour force is more important and the education expenditure should materialize in a better prepared labour force. As compared to other previous studies (such as Levine and Zervos, 1993), in our case, secondary school enrolment has a negative impact on GDP. Still, for the tertiary enrolment ratio we obtain the expected sign, which indicates a positive relationship with GDP, in accordance with Martin and Xavier (1997) or Renelt (1992), who attest the positive relationship between growth and different measures for the degree of education. The level of technological development, approximated by the number of patents, seems to have no impact on the economic growth of the countries; other variables indicating for the extent of technological development should be used in future studies. The first hypothesis is, therefore, confirmed.

Table 2. Results of the panel data model for economic growth

Variable	CHINA			WORLD		
	Model 1	Model 2	Model 3	Model 4	Model 6	Model 5
GFCF	0.2679* (3.317179)	0.35185* (6.322877)	0.324802* (4.580412)	0.254586* (3.587719)	0.244429* (3.600611)	0.214694** (2.653679)
FDI	0.030401** (2.617274)	0.028658* (3.014184)	0.028366* (2.950506)	0.287272* (3.727995)	0.252345** (2.709201)	0.250793** (2.668923)
EED	0.039898* (3.889567)		0.007827 (0.625512)	0.028081* (2.847885)		0.008807 (0.689869)
SEC		-0.003152* (-3.481605)	-0.003053* (-3.290046)		-0.002832* (-3.0259)	-0.002722* (-2.843879)
TER		0.002795* (6.427423)	0.002524* (4.087138)		0.002382* (4.854521)	0.002078* (3.137029)
D(PATENT)		-0.0000162 (-1.204759)	-0.0000152 (-1.111341)		-0.0000078 (-0.542855)	-6.71E-06 (-0.460031)
C	9.807391* (28.26364)	9.726148* (35.32026)	9.824171* (30.77498)	8.501928* (24.76436)	8.96937* (22.16145)	9.084145* (20.60848)
R-squared	0.998097	0.998811	0.998826	0.998041	0.998757	0.998776
Adjusted R-squared	0.997174	0.998121	0.998083	0.997142	0.998035	0.998002
S.E. of regression	0.016895	0.013778	0.013915	0.016957	0.014088	0.014208
F-statistic	1081.776*	1446.97*	1343.916*	1109.081*	1383.886*	1288.91*
Cross-section F	63.69484*	130.07718*	96.763383*	70.71303*	88.914951*	84.791559*
Cross-section Chi-square	108.2843*	143.91539*	131.60086*	118.6317*	126.1779*	125.50248*
Period F	7.267195*	6.554174*	4.89565*	4.058528*	5.230808*	4.270958*
Period Chi-square	54.62908*	53.284214*	45.184485*	40.72529*	46.18559*	41.236997*
Cross-Section/Period F	51.66422*	50.149485*	48.191448*	37.27761*	38.68116*	37.86055*
Cross-Section/Period Chi-square	153.0586*	154.62123*	154.28542*	149.3266*	142.30686*	142.84143*

Note: *, ** and *** denote 1%, 5% and 10% significance levels, respectively. Adjusted R-squared is the R-squared penalized for the number of regressors, S.E. is the standard error of the panel regression and F-stat is the F statistical test. The values in the parenthesis are the t-statistics values.

Source: Author's computations

We consider the level of GDP per capita as a measure of labour productivity, as used in the study of Benassy-Quere et al. (2007). We built the model with several other variables identified in the literature as being relevant for productivity, such as the employment rate and the labour costs. We checked again what is the influence of China's development on the economic growth of the CEE countries as compared to the aggregate influence of the rest of the world. In Table 3, the first two models describe the situation for China, while the last two provide the comparative results for the rest of the world. This time, we built the model by taking into account both the FDI outflows from China (and from the rest of the world), and the exports of the CEE countries to China (and towards the rest of the world). This time, we notice several differences between the two business partners.

Table 3. Results of the panel data model for labour productivity

Variable	CHINA		WORLD	
	Model 1	Model 2	Model 3	Model 4
EMP	-0.0000094 (-0.003051)	0.000314 (0.098569)	0.0000682 (0.030621)	-0.001145 (-0.478466)
NULC	0.000982 (1.396181)	0.001054 (1.451254)	0.001266** (2.364294)	0.001476* (2.896318)
EXP	-0.022795 (-0.496431)	-0.023172 (-0.498115)	0.414759* (3.463835)	0.332195* (2.874228)
FDI	0.031594** (2.245664)	0.03093** (2.161358)	0.32977* (4.048144)	0.299919* (3.080944)
EED	0.038465** (2.63113)	0.037718** (2.534599)	0.035444* (2.731768)	0.036804* (3.153439)
SEC	-0.003227** (-2.47036)	-0.003404** (-2.488676)	-0.002028*** (-1.860088)	-0.002389** (-2.28278)
TER	0.00144 (1.523293)	0.00155 (1.579259)	-0.000489 (-0.565444)	-0.000522 (-0.660632)
D(PATENT)		-9.92E-06 (-0.510976)		5.46E-06 (0.357108)
C	4.155153* (11.16938)	4.148308* (11.00106)	-0.898353 (-0.993285)	-0.03141 (-0.035979)
R-squared	0.991975	0.992049	0.993811	0.995486
Adjusted R-squared	0.98644	0.986086	0.989873	0.9921
S.E. of regression	0.018904	0.019149	0.016777	0.014428
F-statistic	179.231*	166.3594*	252.3489*	294.042*
Cross-section F	72.087189*	60.58542*	100.56978*	66.156219*
Cross-section Chi-square	119.63528*	113.37411*	141.8714*	117.33435*
Period F	16.563457*	15.219618*	6.465836*	8.656738*
Period Chi-square	90.744359*	88.679945*	59.673225*	66.519561*
Cross-Section/Period F	55.189122*	46.870093*	60.689628*	53.827926*
Cross-Section/Period Chi-square	162.40222*	156.25268*	180.75346*	162.88855*

Note: *, ** and *** denote 1%, 5% and 10% significance levels, respectively. Adjusted R-squared is the R-squared penalized for the number of regressors, S.E. is the standard error of the panel regression and F-stat is the F statistical test. The values in the parenthesis are the t-statistics values.

Source: Author's computations

For the models taking into account China, the level of FDI outflows has a positive and significant influence on labour productivity, expressed as GDP per capita. The result is robust and maintains the positive sign in the two models built for China. The expenditure for education also has a positive influence on increasing the productivity, while we obtain, again, a negative relationship between the secondary enrolment rate and productivity. This time, although we obtain a positive sign for the tertiary enrolment rate variable, it is not significant

for our model. The situation is similar for the variable expressing the labour cost, approximated by NULC. Neither the employment rate, not the technological development accounted here by the number of patents, do not have a significant influence for the labour productivity when the models are referring to the business relationship with China.

We obtain a positive and significant impact for both the exports of the CEE countries with the rest of the world and for the FDI levels from these countries. We could assume that, as evidenced in the literature, FDI in the CEE region are market and strategic asset seeking, thus enhancing growth and productivity. However, the level of commercial trade between the CEE countries and China is still underdeveloped, the tendency being to have higher import flows from China than exports to this country. In this way, their impact on the labour productivity is not significant, which does not happen for the exports to the rest of the world. Again, we do not find a significant relationship between the employment rate and the GDP per capita. Still, this time, the variable for the labour costs is significant, but with a positive sign, contrary to expectations. We should take into account that these countries still have a reduced labour cost in comparison to other developed countries, which could explain this situation. For the education variables, the secondary enrolment rate has again a negative sign, contrary to expectations, and is significant, but we do not find any level of significance for the tertiary enrolment rate. The expenditures on education is behaving as in the previous cases, while this time the PATENT variable has a positive, but insignificant impact, on GDPC. Under these circumstances, hypothesis 2 is partially confirmed.

The results for the Granger Causality tests are presented in Table 4³. We obtain a unidirectional relationship between Chinese FDI in the CEE countries and the exports of these countries to China, which points to the fact that Chinese multinationals are the ones that enhance the exports to China, but the opposite is not available. Instead, we find a bidirectional causality between GDP and exports, showing that the growth rate of the economy increases Chinese exports and vice versa (the Chinese exports Granger-cause the CEE countries' economic growth). Finally, FDI Granger-cause GDP, a result that is correlated with the positive and significant impact of FDI on economic growth, as previously mentioned, but the opposite is not true.

³ The results related to the stationarity of the variables could be provided by request.

Table 4. Results of the Pairwise Granger Causality Tests

Null Hypothesis	CHINA		WORLD	
	F-Statistic	Prob.	F-Statistic	Prob.
FDI does not Granger Cause EXP	4.13048	0.0234	11.6785	0.0001
EXP does not Granger Cause FDI	1.22276	0.3052	4.63557	0.0155
GDP does not Granger Cause EXP	3.69102	0.0338	1.76893	0.1836
EXP does not Granger Cause GDP	2.47003	0.0974	0.59924	0.5541
GDP does not Granger Cause FDI	1.88416	0.1652	3.07088	0.0575
FDI does not Granger Cause GDP	3.72622	0.0328	37.4200	7.E-10

Source: Author's computations

For the results taking into account the business relationship with the world, we have two types of bidirectional Granger causality. The probability that the world FDI does not Granger-cause exports to the rest of the world is smaller than 1%, which means that we reject the hypothesis. This is why Granger causality runs from FDI to exports. For a level of significance reaching 5%, we find that the opposite is also available, which means the world exports also Granger-cause the FDI level in the CEE region. Similarly, Granger causality runs two ways, from GDP to FDI and from FDI to GDP in these countries. We found no causality between the volume of exports and GDP. Therefore, hypothesis 3 is partially confirmed.

5. Conclusions

The aim of our study was to cover an important gap in the empirical literature related to the impact of Chinese development in CEE countries. We conducted an empirical analysis aiming at capturing the impact of Chinese development in the last 10 years on the Central and Eastern European countries economic growth, as a way of expressing the perception of these countries related to China's progress and presence in the region.

We employed a panel data approach and Granger-causality tests that allowed for the investigation of the impact of Chinese FDI and trade on the GDP and labour productivity of CEE countries for the 2005-2015 period. Our results point to the fact that not only the total volume of FDI in the CEE countries positively influences the economic growth of these countries, but also FDI having China as home country have a positive and significant impact on the economic development in this region. A positive contribution is also available for the expenditure on education and the tertiary enrolment ratio.

The labour productivity of the CEE countries is also influenced by the volume of FDI coming from China, which points again to the importance of relationship between these countries. However, as the level of commercial trade between the CEE countries and China is still underdeveloped, and the trade balance is usually negative, we did not find a significant impact of CEE exports to China on the labour productivity. Instead, we obtain a positive and significant impact for both the exports of the CEE countries with the rest of the world and for the FDI levels from these countries.

The Granger causality tests further provide interesting results: Chinese multinationals are the ones that enhance the exports to China and Granger-cause GDP, while the economic growth increases Chinese exports and vice-versa. For the results taking into account the business relationship with the world, we found that Granger causality runs two ways, from FDI to exports and vice-versa and from FDI to GDP and backwards.

If we look at the positive impact of the Chinese development on economic growth and productivity, we could consider that the perception is strongly positive. Based on these results, the “16+1” framework of cooperation, founded on the grounds of increased economic and trade cooperation between the CEE countries and China, could represent a useful tool for further enhancing the development of all the partners involved, and public policy measures for supporting this partnership are welcomed. Depending on the capacity and willingness of each country to capitalize on such opportunities, the impact of Chinese investments and foreign trade will potentially improve in the near future.

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