

THE IMPACT OF CHINA SHOCK ON DEINDUSTRIALISATION OVER TIME

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Abstract

This paper analyses the impact of Chinese import competition on deindustrialization measured by real value added and employment share in 61 developed and developing countries over 1970-2010 period. By employing quantile regression with instrumental variables to correct potential endogeneity bias, the results suggest that the main driver of deindustrialization in employment in developed countries is technological change. There is heterogeneous effect of China shock. In developed countries, the effect is destructive in term of both employment and real value added in the lower quantile of distribution, with the higher magnitude for the former. In the higher quantile, complementary effect outweighs detrimental impact. In developing countries, the negative effect of China's shock on real value-added rises as the increase in the proportion of manufacturing value-added in countries. The destructive effect on employment in developing countries seems to be harder after 1990 period.

Keywords: *China, competition, deindustrialization*

1. INTRODUCTION

A vigorous political debate is in topic over the impact of globalisation on the decline in manufacturing sectors in the developed and developing world. China's rapid expansion of manufactured exports looms large in these discussions as it has affected the pattern of trade in international markets. China's share of global manufacturing exports grew from 0.5% in 1978 to 13.7% in 2010. One potential explanation concerning China's export performance is her ability to provide the world with low-cost products. Consequently, it might have had an impact on global prices (Kaplinsky, 2006; Jenkins, Peters & Moreira, 2008). We argue in this paper that increased Chinese trade has induced faster deindustrialisation.

A compelling piece of evidence best represented by Autor, Hanson & Dorn (2013); Acemoglu, Autor, Hanson & Price (2016); Malgouyres (2017) and Federico (2014), shows contracting in employment in low-skill manufacturing sectors in response to Chinese import competition. The contribution of this paper is to provide evidence of the impact of China shock on deindustrialisation in countries at different levels of development and to confirm the hypothesis that the main driver of deindustrialisation over time in developed countries is due to technological progress. Additionally, it is to show that China shock is affecting developing economies more than advanced economies.

Most previous findings have to be interpreted in light of two important aspects. First, existing studies focus their analysis on the negative employment effects of import penetration and rarely mentioned other causes that influence deindustrialisation. Second, the sample is limited for some countries and the time available to undertake the study was also short (Donoso et al. 2015; Federico, 2014; Dauth et al., 2014; Jenkins, Peters & Moreira, 2008; Feenstra and Sasahara, 2018). While the evidence provided in these contributions add to the existing literature by evaluating reactions to shocks on regional employment effects, they have not been utilised to examine the comparable effects or to draw a conclusion on the repercussions of Chinese's penetration as a whole.

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A broader and more balanced picture of the relationship between trade and deindustrialisation can be grasped by extending existing literature using econometric methods with better measures and improved data that are able to incorporate the missing aspects mentioned earlier. The contribution of this paper. First, we use relative share of real value-added and employment in manufacturing to measure deindustrialisation. The benefit of using real value-added instead of nominal is that it minimises the downward bias due to the price effect. Second, we use four decades of period panel data that includes notable countries both developed and developing economies which represent 80-90% of the world's total GDP in PPP. This data allows us to track the pattern of deindustrialization over years, disaggregate the impact of China's shock on different periods and compare the effect on developed and developing economies. Lastly, we employ quantile regression estimation with correction for endogeneity bias using instrumental variables. By conducting these strategies, this thesis contributes to the existing literature.

This paper presents three main results. First, while developed countries have already experienced a rapid decrease in manufacturing employment sectors over decades, Chinese import penetration has made it worse. The effect on employment deindustrialisation is harder than on real value-added, with a magnitude around 2.1 – 2.6 % points for the former and in the region of 0.5 – 1.9 for the latter. Surprisingly, in the countries that have a higher proportion of manufacturing sectors, the effect is complementary. The adverse effect of China clearly affected real value-added with a magnitude around 2.5 – 5.9% points rather than share in manufacturing employment in developing countries. Second, the negative impact of China's shock is empirically greater in developing countries than in developed countries. The level of development also weakens the effect, implying that the wealthier the countries the lower the effect. Lastly, over the period 1990-2010, the impact of China's shock is bigger than previous periods. It happens especially in developing countries, while in developed countries the complementary effect dominates the damaging effect.

2. THEORETICAL FRAMEWORK

Heckscher-Ohlin's theory explains that the driver of international trade is due to differences in factor input for production which originates. Countries tend to export goods whose production makes intensive use of factors of which they have a relatively large supply and imports goods which require large inputs of factors that are locally scarce.

A further factor that encourages countries to engage in international trade is based on differences in endowment related to technology in producing goods as modelled by Ricardian Theory. The differences in technology will affect the need for labour per unit of production in one country relative to other countries. This implies that there would be differences in factor prices which eventually cause differences in national industrial capabilities in producing goods across countries.

In international trade, when trade barrier between countries fall, the production and employment structure of countries tends to become more specialised in sectors in which their factor endowments give them a comparative advantage due to production costs. The earnings of their abundant factors tend to increase relative to those of their scarce factors. Therefore, Hanson (2012) suggests that international specialisation follows the perceived patterns of a country's comparative advantage.

Acemoglu et al. (2016), based on the Heckscher-Ohlin and Ricardo-Viner models of international trade, note that the stronger import competition with China will reduce the relative price of manufacturing goods and generates reallocation of labour and capital toward sectors whose relative prices have increased.

This view is consistent with Wood & Mayer (2010), who state that the entry of China into world markets has affected the sectoral structures of other economies. Given abundant sources of labour-intensive manufacturing resources, China concentrated on exporting labour-intensive manufactured goods and imports goods in which it has a comparative disadvantage in land and resources, for instance primary commodities and skill-intensive manufactured products. The vast expansion of China's exports and the substantial increase of

imports in primary products have altered the relative prices on world markets (Kaplinsky, 2006; Mayer & Fajarnes, 2008; Fu, Kaplinsky & Zhang, 2009) and thus shifted demand functions to the left for labour-intensive manufacturers and to the right for primary goods and skill-intensive manufacturers.

Various studies have investigated the relationship between Chinese penetration and employment in other countries, both developed, middle, or developing countries. For example, Bernard, Jensen & Schott (2006), assert that from 1972-1992, import penetration from low-income countries – with China being the largest member of this group by far, encouraged reallocation of industry in the US toward other industries with less exposure to low-wage country imports and greater capital- and skill-intensity, meaning that US manufacturing is shifting resources from comparative-disadvantage activities towards activities consistent with US comparative advantage and accelerating capital deepening across and within manufacturing industries over time.

The negative effect of Chinese penetration on employment had been examined by Autor, Hanson & Dorn (2013). They find that between 1990-2007, Chinese import penetration contributed to a one-quarter increase in unemployment in US manufacturing industries. Similarly, Acemoglu, et. al (2016), show that approximately 2-2.4 million manufacturing jobs were lost in the US between 1999-2011 as a result of the import competition from China. The relative share of employment related to the US manufacturing sector experienced a steep decline immediately after the new millennium, a question that has been addressed by (Pierce & Schott, 2016). They linked this decline to the new policy granting Permanent Normal Trade Relations (PNTR) status to China. The US had applied low tariffs on Chinese imports since 1980, but they were subject to annual renewal. The PNTR removes uncertainty with regards to tariffs changes due to annual renewals of China's Normal Trade Relations. PNTR have benefited Chinese producers by enabling them to enter and expand into the US market. There is debate whether this new policy has benefited the US consumer. Chinese's penetration seems to have reduced US manufacturing employment by coaxing US producers to invest in capital- or skill-intensive production technologies or less labour-intensive products that are more consistent with US comparative advantage. It can be observed that industries most affected by PNTR exhibit increases in skill intensity.

The effects of Chinese export exposure may vary across countries depending on the structure of the economy of each country. Middle- or developing countries compared to developed countries, in general also have a comparative advantage in labour intensive sectors. They may experience further increase in unemployment if they fail to compete with China. However, empirical findings show that there are also benefits resulting from Chinese expansion. For example, Jenkins, Peters & Moreira (2008), emphasise that growth trade with China has been positive, though it has created winners and losers in Latin America and the Caribbean. Producers and exporters of raw materials such as agriculture, agroindustry and industrial inputs have been the winners, seeing as their exports to China increased sevenfold between 1999-2005. However, countries that specialised in commodity chains such as yarn-textile-garments, electronics, automobiles and auto parts appear to be the losers both in domestic and third markets. This is because Chinese competition caused job losses in garments and textiles export industries, plant closures and that employment had declined as a result of competition from China in the US market.

After the 2nd unbundling, the production structure became more fragmented and firms in advanced countries produce goods in other countries via labour intensive segments of their supply chain to developing countries. Thus, since China has been able to provide labour intensive resources with lower wages relative to other countries, it's role has increased rapidly and it has been the biggest winner as the supplier of intermediates goods with roughly 11% of global intermediate exports (Baldwin & Lopez-Gonzalez, 2015). The global value chains that run through China may represent a significant opportunity as well as a threat. The negative effect is shown in some countries in East Asian and NIEs (Athukorala, 2009). Countries like Japan, Korea and Hong Kong are less competitive than China due to the high wages which then leads to the comparative advantage being lost on production lines, as an

integral part of the global value chain. However, the boost in China’s processing industries has a positive spill over by increasing demand for intermediate goods from other countries in East and South Asia. The finding shows that from 1996-2011, China had a positive effect on employment in East Asia and ASEAN members by providing export opportunities to these countries (Feenstra and Sasahara, 2018).

However, the improved growth of China’s main exports in the clothing and textile industries appears to have had a detrimental impact on other countries in Asia which have the same base. Even though there is a positive effect through intra-industry trade caused by China’s rise, it look as if that the effects of the competition are much greater than the positive effects (Amann, Lau & Nixon, 2009). Those that suffer the least are the high income countries (e.g. Japan and South Korea) given that the effects of the competition are alleviated by investment through foreign direct investment (FDI) or subcontracting operations, whereas middle income countries are the main losers as they face strong competition from not only China but also low-income countries in Asia. Similarly, Giovannetti & Sanfilippo (2009), also assert that between 1995-2005. Chinese’s exports to Africa statistically reduced African exports in manufacturing products to their main developed market. Specific industries especially in textiles, clothing and footwear were displaced as they failed to compete with Chinese competition in regional markets. As a result, the reallocation effect emerged increasing competition, as the theory suggests. Iacovone, Rauch & Winters (2013), reveal that competition with China has significantly influenced production patterns regarding domestic and export markets in Mexico. The flow of exports from China challenged Mexican firms and cause firms to exit from the market and reduce their product and sales. Surprisingly, even though this shock forces some smaller and less productive plants to close down, it prompts larger plants and core products to increase productivity and even expand.

3. RESEARCH METHOD

To examine the impact of Chinese penetration across country, we will use quantile regression estimation which allows the coefficients of the main regressor besides the explanatory variables to vary across the distribution of the dependent variable. This method can avoid sample selection bias which is not captured by pooled OLS. We will develop the structural transformation model proposed by Era Dabla-Norris et al., (2013). The functional form specified at the level of sector i , country c in year t has the following structure:

$$s_{ict} = \beta_0 + \psi_1 \ln(CShock_t) + \psi_2 (\ln(CShock_t) \times \ln(rgdppc)) + \beta_1 \ln(rgdppc_{ct}) + \beta_2 (\ln(rgdppc_{ct}))^2 + \sum_j \phi_j Z_{jct} + \sum_t \theta_\tau D_t + \epsilon_{ict} \dots \dots \dots (1)$$

Dependent variables:

The dependent variables are the real value-added and employment share in three sectors of the economy – agriculture, manufacturing and services. The value-added measure is sensitively affected by the relative price. The relative price of manufacturing in countries tends to become smaller as the level of development increases. This price effect can create a downward bias in the nominal value-added share of manufacturing. Therefore, we will use real value-added in manufacturing sector instead of nominal value-added in addition to employment shares as dependent variables.

Explanatory variables:

Changes in the value of manufacturing goods imported from China will be used as a proxy of China’s penetration following the approach outlined by Autor et al. (2013). The intuition of this proxy is because the changes in the foreign supply of manufacturing goods may replace domestic production, decreasing the amount of output produced domestically and lowering demand for labour as regards production. We also add an interaction variable between China’s penetration with GDP per capita to examine the differences in the effect of competition with China with regard to the GDP per capita of countries.

Control:

This regression includes a broad set of determinants which may affect the demand and supply factors as the control. These variables can be seen as endowment factors which institutions have limited ability to influence, at least in the short run. First, land area - land area measures the size of a country. Size may have an effect on output as related to scale effects (Rose, 2006). It is due to the effect of scale on a variety of intermediate inputs, effects on market structure and information spillovers. Area also may determine the average labour productivity of a country (Frankel & Romer, 1999). Second, population - Population represents workforce as the labour input factor as regards production in a country (Alcalá & Ciccone, 2004), as well as demand for output. Thus, it may affect both the supply and demand of goods. Third, the share of arable land of the total land - Arable lands is the land area in a country that can be ploughed and cultivated. Indeed, it will affect production in the agricultural sector. Fourth, a dummy variable for transition economy. It covers some Central and Eastern Europe countries and the former Soviet Union. The transition of emerging economies from a socialist to a market-based economy may affect the governmental institution. It will have an effect on the entire economy, such as the structure of the business and financial sectors which may increase the speed of structural transformation (Svejnar, 2002). Fifth, a dummy variable for island economies - Island countries may have limited access to neighbours. They have to bear the relatively higher costs of land transport (Srinivasan, 1986). Sixth, the share of mining in total value-added. "Dutch disease" theory explains that the boom in natural resources will have an effect on resource movement and spending effect in the economy. Labour will shift to the "boom" sector as they offer higher wages and productivity (Corden & Neary, 1982). Seventh, age dependency ratios young and old. It is the percentage of non-working young and old people of the total labour force. The age dependency ratio may have an effect on the supply of labour, savings and consumption performance which may affect the elasticity of demand for agriculture products, manufacturing goods or service (Kelley, 1973). Finally, the relationship between structural changes and level of development is likely to be curvilinear. The increase in GDP per capita is linked with the decrease in the agricultural sector and increase in services, while the manufacturing sector follows an inverted U-shape. It is expected to increase when development is at an early stage, but then decrease when the economy reaches a certain level of development. Thus, GDP per capita and (GDP per capita)² are included and expected to have a positive and negative coefficient, respectively. The model also includes year dummies to account for technological change.

An obvious problem when estimating these regressions is the potential endogeneity of Chinese imports. Endogeneity bias arise if there is a reverse causality relationship between imports from China and the share in manufacturing real value-added or employment, or there are omitted variables (unobserved factors) that include in the term disturbance which also affects imports from China, such as the improvement in technological production which reduces cost that impacts on the export performance of China and other countries. Should this be the case, imports from China may be correlated with the error term, thereby biasing the estimated coefficient on this variable. To overcome this, we will consider the instrumental variable (two-stage least squares) estimation with three excluded instrumental variables: First, I use the initial level of manufacturing imports in 1970 as an instrument to avoid potentially endogenous factors. In 1967, China experienced a Cultural Revolution shock and has changed from being an exporter of foodstuffs to being a manufacturer of goods. This is the beginning of trade expanding after experiencing the Great Leap Forward (Fan, 1972). After that, in 1970, China began to export to non-communist countries, especially to Japan, West Germany, France, North America and Hong Kong. In this year, China also started to import capital to increase their exports (Ho, 1980). Thus, these initial export values can be a good predictor of future trading partners for the Chinese and express the comparative advantage regarding intensive labour manufacturing industries. Second, I use the first lag of import from China as suggested by Reed (2015). Using lagged values of the endogenous explanatory variable as instruments can provide an effective estimation strategy if the lag value does not belong in

the respective estimating equation and it is sufficiently correlated with the explanatory variable. The final instrument is the distance between the importing countries to China, as suggested by the standard gravity model (Frankel & Romer, 1999). The distance from China to the export market is potentially correlated with the value of imports but has no effect on the share of manufacturing value-added/employment.

The use of the instrumental variable estimator over the OLS estimator is justified only if the instruments satisfy two conditions: they must be partially correlated with the endogenous explanatory variables (“instrument relevance” condition) and must not be correlated with the disturbance process of the second-stage equation (“orthogonally” condition). The relevance of the instruments is tested using two alternative tests: The F-test relating to the joint significance of the instruments in the first-stage regression. Instrument orthogonality is tested using the Hansen J-statistic which also provides a valid test of the suitability of the overall specification of the model.

Quantile regression with endogeneity correction using the extended quantile regression technique, known as generalised quantile regression (see Powell, 2019) will be performed subsequently. Using this estimation, we will use Markov Chain Monte Carlo (MCMC) simulation as we have more than two independent variables as suggested by Chernozhukov & Hong (2003). This method allows the model to more closely reach the distribution of the sample matches the actual distribution requires. At the end, to conduct a robustness test, we will examine the second phase of the globalisation period, 1990-2010, where China has made a significant contribution to international trade worldwide. In the robustness test, we will compare this period and the previous period to examine the third hypothesis.

4. RESULT AND DISCUSSION

From the quantile regression results in Table 1, we see the impact of China’s penetration on different distributions of the sample countries. Imported manufacturing goods from China seem to significantly decrease the manufacturing value added at all levels of distribution. Along with increasing the share of manufacturing value-added, the impact gives the impression that it is bigger. Group countries that belong to quantile .75 such as Indonesia, Italy, Mexico and Sri Lanka suffer the most. This might be for the reason that these countries have a similar comparative advantage with China’s products such as in electronics, textile and clothing. They might fail to compete with Chinese products; thus, some of the manufacturing output experiences a downward trend. Countries such as Saudi Arabia, the US, Nigeria, Algeria and Hong Kong which belong to quantile .10 seem to experience a lower negative effect. The coefficient of variable manufacturing import from China is the smallest compared to other quantiles. This finding also reveals that even though these countries have a small share in manufacturing output and have a different comparative advantage to China, they have still been influenced by China’s shock. The interaction term between GDP per capita and share in real value-added is significantly positive in all quantiles. It indicates that as countries become wealthier, the declining real VA affected by China’s shock will be weakened. During period 1970-2010 in almost all quantiles, the year dummies exhibit positive and significant signs, but with decreasing magnitude. This implies that most countries have experienced deindustrialisation in real manufacturing value-added over years. This finding is in line with (Rodrik, 2016), who examines deindustrialisation over time. On average, the biggest reduction is countries that belong to quantile .25 such as Australia, Bangladesh, India, Canada and Tunisia – 1.819 (-0.199-1.620) percentage points lower in 2009 than in 1970.

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Table 1—Quantile Regression with Endogeneity Correction VA-Manufacturing ALL COUNTRY (1970-2010)
Dependent Variable: Share of real Value Added in Manufacturing Sector

	IV NO Trend Dummv					IV WITH Trend Dummv				
	O10 va_man	O25 va_man	O50 va_man	O75 va_man	O90 va_man	O10 va_man	O25 va_man	O50 va_man	O75 va_man	O90 va_man
lnnom_man_imp	-0.416*** (0.056)	-0.940*** (0.146)	-1.148 (0.746)	- (0.184)	-1.467*** (0.108)	-0.606*** (0.013)	- (0.046)	-2.339*** (0.026)	- (0.015)	-1.598*** (0.009)
ln ppppc	11.513*** (0.164)	11.701*** (0.837)	7.400*** (1.632)	6.301*** (0.638)	2.040*** (0.140)	12.357*** (0.046)	9.834*** (0.062)	9.052*** (0.123)	4.150*** (0.076)	2.519*** (0.021)
ppppcxmanimpCHN	0.061*** (0.008)	0.118*** (0.021)	0.128 (0.091)	0.339*** (0.021)	0.176*** (0.013)	0.130*** (0.002)	0.201*** (0.006)	0.302*** (0.003)	0.294*** (0.002)	0.197*** (0.001)
ln ppppc2	-0.798*** (0.018)	-0.865*** (0.031)	-0.647*** (0.118)	- (0.053)	-0.404*** (0.019)	-0.952*** (0.003)	- (0.009)	-0.926*** (0.009)	- (0.005)	-0.445*** (0.002)
teco	-5.684*** (0.079)	0.201 (0.189)	2.435*** (0.362)	2.043*** (0.131)	3.595*** (0.131)	-6.608*** (0.017)	- (0.048)	2.112*** (0.056)	2.239*** (0.024)	3.623*** (0.017)
ieco	1.565*** (0.199)	2.114*** (0.226)	2.114*** (0.495)	3.460*** (0.182)	2.986*** (0.128)	2.002*** (0.030)	1.552*** (0.035)	2.196*** (0.085)	3.459*** (0.023)	2.694*** (0.021)
va mu	-0.177*** (0.002)	-0.132*** (0.006)	-0.065*** (0.014)	0.057*** (0.003)	0.276*** (0.003)	-0.197*** (0.000)	- (0.001)	-0.078*** (0.002)	0.067*** (0.000)	0.271*** (0.000)
lnlandarea	0.656*** (0.039)	-0.387*** (0.055)	-0.538*** (0.045)	- (0.069)	-0.557*** (0.015)	0.700*** (0.002)	- (0.005)	-0.579*** (0.009)	- (0.004)	-0.553*** (0.002)
lnpop	-0.408*** (0.071)	0.661*** (0.160)	0.872*** (0.157)	1.013*** (0.089)	0.978*** (0.042)	-0.856*** (0.004)	0.122*** (0.008)	0.510*** (0.016)	0.921*** (0.006)	0.933*** (0.004)
arable	0.041*** (0.003)	-0.030*** (0.006)	-0.039*** (0.010)	- (0.001)	-0.043*** (0.005)	0.043*** (0.000)	- (0.001)	-0.020*** (0.001)	- (0.000)	-0.039*** (0.000)
agedep young	-0.055*** (0.002)	-0.078*** (0.008)	-0.118*** (0.011)	- (0.012)	-0.123*** (0.002)	-0.068*** (0.000)	- (0.001)	-0.103*** (0.001)	- (0.000)	-0.130*** (0.000)
agedep old	-0.048*** (0.005)	-0.111*** (0.017)	-0.086*** (0.022)	- (0.019)	-0.051*** (0.004)	-0.130*** (0.001)	- (0.002)	-0.134*** (0.002)	- (0.002)	-0.054*** (0.001)
cons	-26.242*** (1.363)	-22.285*** (7.097)	1.163 (14.117)	19.191** (2.858)	21.881*** (1.407)	-22.716*** (0.333)	- (0.504)	6.618** (0.702)	23.672** (0.450)	20.186*** (0.154)
Obs.	2501	2501	2501	2501	2501	2501	2501	2501	2501	2501
R-squared	-	-	-	-	-	-	-	-	-	-
Year Dummies	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
Number of Countries	61	61	61	61	61	61	61	61	61	61
IV	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

Table 2—Quantile Regression with Endogeneity Correction Manufacturing Employment Share ALL COUNTRY (1970-2010)
Dependent Variable: Share of Employment in Manufacturing Sector

	IV NO TD					IV WITH TD				
	O10 eman	O25 eman	O50 eman	O75 eman	O90 eman	O10 eman	O25 eman	O50 eman	O75 eman	O90 eman
lnnom man imp	-0.000 (0.002)	-0.019*** (0.007)	-0.009*** (0.003)	-0.030*** (0.001)	-0.032*** (0.000)	0.002*** (0.000)	0.003*** (0.000)	0.017*** (0.000)	0.016*** (0.000)	0.020*** (0.000)
ln ppppc	0.224*** (0.010)	0.257*** (0.019)	0.329*** (0.041)	0.319*** (0.008)	0.365*** (0.003)	0.338*** (0.000)	0.281*** (0.000)	0.204*** (0.001)	0.267*** (0.001)	0.335*** (0.001)
ppppcxmanimpCHN	-0.001*** (0.000)	0.001 (0.001)	-0.000 (0.000)	0.002*** (0.000)	0.003*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)	-0.002*** (0.000)
ln ppppc2	-0.013*** (0.001)	-0.018*** (0.002)	-0.018*** (0.002)	-0.022*** (0.001)	-0.026*** (0.000)	-0.020*** (0.000)	-0.016*** (0.000)	-0.009*** (0.000)	-0.012*** (0.000)	-0.017*** (0.000)
va mu	-0.000 (0.000)	0.000 (0.000)	0.000* (0.000)	0.000*** (0.000)	0.002*** (0.000)	0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	0.000*** (0.000)
lnlandarea	-0.002*** (0.001)	-0.008*** (0.000)	-0.024*** (0.002)	-0.026*** (0.000)	-0.040*** (0.000)	-0.004*** (0.000)	-0.006*** (0.000)	-0.012*** (0.000)	-0.018*** (0.000)	-0.025*** (0.000)
lnpop	0.010*** (0.001)	0.011*** (0.000)	0.029*** (0.004)	0.029*** (0.001)	0.042*** (0.000)	0.005*** (0.000)	0.005*** (0.000)	0.011*** (0.000)	0.018*** (0.000)	0.020*** (0.000)
arable	-0.000*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.000*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
agedep young	-0.002*** (0.000)	-0.001*** (0.000)	-0.001 (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
agedep old	0.005*** (0.000)	0.005*** (0.000)	0.004*** (0.000)	0.005*** (0.000)	0.005*** (0.000)	0.004*** (0.000)	0.003*** (0.000)	0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
cons	-0.798*** (0.042)	-0.693*** (0.060)	-1.278*** (0.250)	-0.925*** (0.026)	-1.153*** (0.016)	-1.454*** (0.001)	-1.125*** (0.000)	-0.919*** (0.003)	-1.233*** (0.004)	-1.487*** (0.002)
Obs.	1230	1230	1230	1230	1230	1230	1230	1230	1230	1230
R-squared	-	-	-	-	-	-	-	-	-	-
Year Dummies	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
Number of Countries	30	30	30	30	30	30	30	30	30	30
IV	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

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Table 2 shows the the impact of Chinese's penetration on manufacturing employment in different quantiles over 1970-2010. Before being controlled by time dummies, the effect is negative in all quantiles. The pattern indicates that along with increasing in the share of manufacturing employment, the suffer gradually increase. Again, the interaction term has opposite sign with variable manufacturing import from China, it implies the damage will reduce as the countries become wealthy. Surprisingly when the model is controlled by time dummies, the impact of China's product generates positive sign in all quantile. It implies that the average countries in the sample over period of study have benefitted in term of employment creation in effect of trading with China. It might be true because the data of import from China includes both final goods and intermediate goods. In the case of intermediate goods, when it is processed in the countries' destination, it will be the input factor of production. The increase in input is likely to rise labor demand to process it. The countries that gain most is one that belong to quantile .90 such as Germany, Hong Kong, Korea, Sweden. It is important to note that while other quantile have some developing countries member, in quantile .90 only developed countries that belong to this quantile. It might be the case as the growing role of China in the pattern of South-North trade in the recent decades.

In the second phase of Globalisation, the world economy is becoming more profoundly integrated due to the decrease in transport costs and substantial effect of technological changes. Prior to 1990, China's exports were dominated by clothing, shoes, children's toys, food and agricultural goods. In 2008, Hanson (2012), documented that the composition of China's exports changed dramatically as the highest share of exports to GDP is with regards to electronic products. Additionally, other goods also experienced substantial growth, such as metals, chemicals, machinery and transport equipment, whereas clothing, shoes and food exports show a declining trend. This might be true due to the dynamics of the Chinese market and the increased sophistication of Chinese exported goods (Rodrik, 2006). Moreover, Baldwin & Lopez-Gonzalez (2015) and (Sturgeon, 2010) highlight that production for global markets is primarily concentrated in China. This is reflected in the intermediate goods trade flow from high income countries to China. At the same time, China is also a country that supplies intermediate goods for various developed countries.

If we relate the robustness test of the impact of China on real VA in the period 1970-1989 vs. 1990-2010 in developed countries, the results are in accordance with dynamic production structure in China. From 1970-1989, developed countries in quantile .25 such as Australia, Canada, Netherlands and Sweden experienced a decline in real manufacturing value-added as China increased its imports, but the effect diminishes as the increase in GDP per capita is reflected in the interaction between GDP per capita and manufacturing imports from China. However, between 1990-2010, countries in this quantile benefit from manufacturing goods obtained from China. The opposite story happens in countries belonging to quantile .50, such as Portugal, Spain and the UK. From 1970-1989, they took advantage of China's manufacturing goods, although from 1990-2010, they experienced negative effect because of a flood of "made in China" goods.

Interestingly, countries in quantiles Q.75 and Q.90, such as Germany, Japan, Korea, Singapore and Switzerland, gained an advantage from China's products relating to their real value-added in both periods. Moreover, the benefits increased after the 1990s (from 0.085% and 0.089% points during 1970-1989 to 0.97% and 0.75% points in the period 1990-2010, respectively, if their imports from China increased by 1%). Logically, it might be true, as recently China export of intermediate goods to rich countries is growing. It should be mentioned that the increase in imports of intermediate goods will increase the production output of numerous developed countries. Baldwin & Lopez-Gonzalez (2015), explain that China is the source of many low-tech intermediate goods that are used in Germany, Korea, the US and Japan. These are embodied in their high-tech components which indicates that advanced-technology companies are undertaking labour-intensive upstream stages such as plastic, rubber and steel parts, that are subsequently used in Germany, US, Japanese and Korean overseas where labour is cheaper. This finding is also in line with the trend of output captured by time dummies. Over 1970-1989, even though the coefficient sign is negative,

developed countries still maintain positive output growth in all quantiles; in the region of 0.11% - 2.98% points in 1988 relative to 1970. From 1990-2009, there is also an increasing trend in the production of manufacturing goods in the region of 0.4%-6.2% in year 2009 relative to year 1990. This implies that developed countries have indeed not experienced deindustrialisation in term of real value added.

The effect of China shock on developing countries appears by means of a competition channel. Developing countries which lose competitiveness with Chinese products in both domestic and international trade will experience contraction in manufacturing sectors. This is shown in the quantile regression results for developing countries; the higher the share of value-added in manufacturing, the higher the contraction. From 1970-1989, the reduction is roughly 1.61% - 3.38% points in all quantiles. However, from 1990-2010, the loss is greater at around 4.59%-8.61% points in developing countries if their imports from China increased by 1%. Countries that have suffered the most are those that belong to quantile .90 such as Brazil, Malaysia, Philippines and Thailand. This might be true as they manufacture similar products to China such as machines, electronics, textiles and clothing.

This finding is also consistent with the magnitude captured by time dummies. Deindustrialisation in real value-added is approximately 1.512% - 3.071% points in 1988 relative to 1970. This decline is much larger during the second phase of globalisation (1990 onwards) at roughly 5.264% - 11.141%. This finding is in agreement with (Rodrik, 2016), who highlights premature deindustrialisation in developing countries.

The relative share of employment in developing countries seem to be severe hurt more than in advanced countries, due to the effect of Chinese's penetration. Developing countries in quantile .10, .25, .50 seem to be hurt much in the second phase of globalization period, whereas in the countries that have relative high proportion of employment in manufacturing such as Malaysia tend to benefit due to flow of imported manufacturing goods from china. In developed countries, surprisingly, over 1990-2010, the coefficient is positive in all quantile, meaning that they benefit from trading with China in term of manufacturing employment.

During 1970-1989 period, in developed countries, China's goods significantly destroy the proportion of manufacturing employment in quantile .10, .25, .50, and .75, however from the interaction term, the negative effect diminish as the increase in their income per capita. In the highest quantile, the impact is positive. The reverse condition prevails in developing countries, they benefit more during almost in all quantile before the rise of China. The explanation of these changes is probably due to the dynamic of comparative advantage of China's product (Rodrik, 2006) and the changes in the structure of international trade in recent decades (Hanson, 2012).

Developed countries may benefit from the low prices of China's product and eventually expand the manufacturing industry in the top level similar with the case of Mexico (Iacovone et al., 2013). The developed countries may have moved from the labour-intensity production to skill-intensity, so the effect of China's product which mainly dominated by labor-intensity product become less significant. The developing countries seem to suffer much due to losing in competitiveness from China's product. Countries will contract their manufacturing industries as the decrease in local product demand either from domestic market or foreign. However, the other countries also get benefit especially in the high quantile as they expand their industries which is reflected from the positive coefficient in the variable import from China.

5. Conclusion

This thesis has examined the impact of China shock on deindustrialisation in developed and developing countries. The rapidly growing role of China in international trade may constitute the most important trade shock from low wage countries to depress global prices. The results suggest that there is a heterogeneous effect of Chinese import penetration in developed countries. In the lower quantile of distribution, the effect is negative in terms of both employment and real value-added, with the higher magnitude for the former. In the higher quantile, surprisingly, complementary effect outweighs detrimental impact. In

developing countries, the effect of China's shock on real value-added rises as a result of the increase in the proportion of manufacturing value-added in countries. The harmful effect on employment in developing countries seems to be harder after 1990. Nevertheless, in the highest quantile, employment creation surpasses employment destruction both in developed and developing countries. This finding may reveal that Chinese competition is forcing some smaller and less productive manufacturing sectors to close down and boost the productivity of high-level manufacturing industries in the higher quantile to expand. This might be the case as China provides input with lower prices which may benefit these industries.

The limitation of this paper is that the import of manufacturing goods is calculated in nominal PPP. Moreover, as price level data to decrease the nominal value to real value was unavailable, we could not provide the value in real terms. Consequently, the result might be biased due to changes in price level. Next, the data includes both final and intermediate manufacturing goods, so we cannot precisely measure the type of goods that indeed induce damaging or complementary effects.

The heterogenous impact of China's shocks should be responded to differently by country. Based on comparative advantage trade theory, trade should be beneficial for both parties. However, empirical evidence does not say so. Policymakers must ensure that gains from trade are shared equally. In developed nations, they have a relative abundance of skilled workers who are somewhat easier to move toward higher productive sectors. Improving flexibility and accessibility should be beneficial in the transitioning period from a negatively affected sector towards new and better opportunities. Developing economies which have a relative abundance of unskilled labour should focus on assistant programmes and stimulate education and skills improvement in the direction of upgrading skills and productivity progression.

Further analysis should be undertaken based on the latest data, including more precise information on the type of manufacturing goods from China using both real and nominal value. In order to get a balanced picture on the effect of China, export opportunities from each country to China should be considered. Disaggregating data samples by skills or by region should be potentially valuable for the sake of assessing the impact of China for further details.

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