Investigating Causality Effect among Labor Productivity Growth and Industrialization, Urbanization, Globalization in China

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This study seeks to empirically test Granger-causality among China's labor productivity (LBP) growth and industrialization (IND), urbanization (URB), globalization (GLB). It examines IND – the proportion of non-agricultural sectors to Gross Domestic Product (GDP), GLB – measured by foreign direct investment (FDI) and the total value of imports and exports (VIE), and URB – measured by the proportion of urban population. Data are taken from the published China national database. Unit root and Johansen Cointegration tests are deployed to test the stationary and cointegration of the variables. The results reveal that LBP growth is determined by the level of IND, URB, and GLB.

INTRODUCTION

Since 1978, China has adopted reform and opening-door policy. The process of industrialization (IND) began to accelerate (UNIDO, 2013). Meanwhile, China's rapid urbanization (URB) is largely caused by its successful IND (Zhang, 2017). URB is a process in which the productive factors and population continue to gather in cities and towns, and the towns continue to grow under the leadership of the market and government mechanisms (Gu, et al., 2017). IND led the expansion of modern cities and provided financial support for URB. URB is the carrier which is providing the developmental environment of IND (Liu, et al., 2015).

Globalization (GLB) is a consequence of IND and URB (Huff & Angeles, 2011). IND and URB have led to the construction of large-scale factories, housing construction and the construction of infrastructure such as railways, highways, bridges and ports. Expansions in China's construction and manufacturing industries, combined with the increase in living standards of residents, have stimulated China's imports of bulk commodity such as oil, iron ore, and copper (Chen & Zhang, 2016). China has very high comparative advantage in the industries which need unskilled labor, therefore, after joining the World Trade Organization (WTO) in 2001, China substantially increased its exports (Rodrik, 2006). IND has made China the world's largest manufacturer and exporter (UNIDO, 2013). In the same period, foreign direct investment (FDI) has played an important role in contributing to China's GLB. Chinese government formulated a series of FDI policies, such as tax incentives and the guiding directory on industries open to foreign investment (Long, 2005). Macroeconomic data supported these views. China's URB level rose from 17.9% in 1978 to 57.3% in 2016, while the share of the non-agricultural industry increased from 72.3% to 91.4%. In China, the total value of imports and exports (VIE) as the proportion of GDP rose from 9.7% in 1978 to 32.9% in 2016, while the FDI as a percentage of GDP increased from 0.3% to 1.1% (National Bureau of Statistics of China, 2017).

In the process of IND, URB, and GLB, China's labor productivity (LBP) has been improved. Since 1978, more than half a billion Chinese people were urbanized as rural people moved to cities. As farmers turn to urban employment, LBP is improved (WB and DRCC 2014). In China, growth of investment in the industrial sector has been the most important factor driving overall LBP growth since the early 1990s (Kuijs & Wang, 2006). FDI impacts economic growth through its interaction with LBP (Alam, et al., 2013). The IND, URB, and GLB have brought profound changes to China's economy and society (Friedmann, 2006). However, LBP is a determinant of national competitiveness (Delgado, et al., 2012).

From the existing research literatures and macroeconomic data, China's IND, URB, GLB, and LBP growth seem to have a close interaction. Most of the existing research focused on the relationship between IND and URB, IND and GLB, IND and LBP, URB and GLB, but few literatures explored the relationship among LBP and IND, URB, GLB from an overall perspective.

The aim of this paper is to analyze the impact of IND, GLB and URB on LBP in China. We choose one IND indicator for the analysis: the proportion of non-agricultural sectors to GDP; two GLB indicators are used: FDI, VIE; one URB indicator is used in the analysis: the proportion of urban population. We use the macroeconomic statistics released by the Chinese National Data (National Bureau of Statistics of China, 2017). This paper is divided into four sections. The next section discusses literature reviews; followed by methods and data analysis; and finally, conclusions, discussions, and implications.

REVIEW OF THE LITERATURE

Industrialization and Labor Productivity

IND has been fueled by dramatic LBP growth (Kim & Topel, 1995). IND and the rise of the service sector have affected the LBP growth (Deng, et al., 2008). In the process of IND, the input elements flow from the relatively low productivity of the manufacturing sector to the more productive sectors. This process has contributed to LBP growth (Altıok & Tuncer, 2012). Industrialized agriculture has promoted the application of new technologies and increased the agricultural LBP (Hogeland, 2013). In the United States, increases in the percentage of the labor force employed in the nonfarm sector of a state's economy suggest that previously unemployed or underemployed farmers and farm workers have found employment in the industrial or service sectors where their marginal productivity is likely to be higher, and that technological advances in agriculture have increased the marginal LBP of farmers (Grasso & Sharkansky, 1980). In China, with the privatization reforms, IND has had both a short run and increasingly long-term positive impact on the LBP across the regions (Zheng, et al., 2017). A part of privatization is the shift from state-owned enterprises to private owning (Li, et al., 2011).

Urbanization and Labor Productivity

URB is a natural and inevitable consequence of IND because IND entails a massive shift of labor and other inputs from rural agricultural sectors to urban industrial sectors (Hamer & Linn, 1987). IND results in the process of URB, in which urban population increases and rural population falls as manufacturing and services expand (Alvarez, et al., 2011; Brückner, 2012; Michaels, et al., 2012). The process of transferring rural surplus labor force to the industrial sector is the process of raising LBP (McCullough, 2017). There is a virtuous circle between IND and URB since they usually go hand-in-hand (Henderson, 2010).

Cities with high population densities allow both workers with differentiated skills and firms with specific needs to reduce their search costs, thus promote LBP growth (Spence, 2009). URB has produced a human capital accumulation effect, and LBP has been continuously increased by this effect (Acemoglu, 1996). URB increases average LBP by offering opportunities for education, employment, and health services (Ciccone & Hall, 1996). Doubling city size increases LBP across industries (URB economies) in the United States by 3–8 percent (Rosenthal & Strange, 2004).

Globalization and Labor Productivity

GLB is a key driver for labor to flow from low-productivity activities to high-productivity activities, as a result, the country's average LBP has been raised (Mcmillan & Rodrik, 2014).The elements of GLB include free movement of goods and services, the flow of capital, movement of labor and the transfer of technology (Bhandari, 2005). Transnational movement of goods and services mean exports and import. Transnational flow of capital means foreign investment and outward investment. There exists causality between exports and LBP growth in Italy (Yamada, 1998). Export growth causes LBP growth. An initial export stimulus may lead to a "virtuous circle" in LBP growth through economies of scale and price competitiveness (Beckerman, 1965; Atesoglu, 1994). With the growth of employment and wages, exports have a positive effect on LBP (Wagner, 2002). Direct exporters seem to learn more about how to produce and what to produce than indirect ones, so LBP evolve more favorably under direct exporting (Bai, et al., 2017). Import competition interacts with domestic competition influence the LBP (Bloch & McDonald, 2001).The competition from imported goods forces domestic companies to choose quicken their pace of innovation, thus promoting LBP growth (Baldwin, 2004). The positive impact of FDI on LBP growth is the impact of FDI spillovers (Ramirez, 2000). In China, coastal areas have more exports and more FDI than inland areas; therefore have higher industrial LBP (Fujita & Hu, 2001).

METHODOLOGY, DATA, AND STATISTICAL ANALYSIS

In order to study the short-term and long-term relationship among IND, URB, GLB, and LBP during 1978-2016, this study uses the time series model, Granger causality test (Granger, 1969), Unit-root test (Dickey & Fuller, 1979), and Johansen cointegration test (Johansen & Juselius, 1990). The Granger causality test is used to test the statistical hypothesis for verifying whether one-time series is suitable for forecasting another. The Unit-root test is used to test whether the time series variables are non-stationary and possesses a Unit-root. The null hypothesis is defined as the presence of a Unit-root and the alternative hypothesis tests period-to-period change (stationarity) in the time series variables. This methodology was validated by some researchers such as Shukur & Mantalos (2000) and Liu, et al. (2014). For this research, we established the VAR model, using the EViews 7.0 software, with a non-structural approach to establish the model of the relationship between various variables, namely Vector Auto-Regression model (VAR). The traditional econometrics model describes the relationship between variables, but the economic theory is usually not sufficient to provide a strict description of the dynamic relationship between variables (Granger, 1974). To solve this problem, this study uses the Vector Auto-Regression model VAR.

Relationship among China's Industrialization, Urbanization, Globalization and Labor Productivity

General expression of the VAR model is as follows:

$$Y_t = C + \Phi_1 Y_{t-1} + \ldots + \Phi Y_{t-p} + \Phi_p Y_{t-p} + HX_t + \varepsilon_t \quad t=1, 2, \ldots, T \tag{1}$$

where Y_t is the column vector of k-dimensional endogenous variables, X_t is the column vector of d-dimensional endogenous variables, p is the lag order; T is the number of samples; k×k-dimensional matrix $\Phi_1, \ldots, \Phi_p$ and k×d-dimensional matrix H are the coefficient matrices to be estimated; ε_t is the k-dimensional disturbance column vector.

Taking into account the data available, the following indicators are selected for this research: 1) based on the studies of Broadberry & Harrison (2005), Gu, et al. (2017), and Statistics Communique on the

2016 National Economy and Social Development of China (NBS, 2017), this research selects per employee GDP (total gross domestic product divide by number of employed persons) as the indicator of LBP; 2) based on the studies of Kozan (1993), Bairoch & Kozul (1998), and Zhang (2006), this study selects the proportion of non-agricultural sectors to GDP as the indicator of IND; 3) based on the studies of Zhou and Ma (2003), Zhang and Song (2003), and "Statistics Communique on the 2016 National Economy and Social Development of China" (NBS, 2017), the proportion of urban permanent residents to total population is selected as the indicator of URB; 4) based on the studies of Fujita & Hu (2001), Bhandari (2005), and Gygli, et. al. (2018), this study selects VIE and total amount of FDI as the indicator of GLB. VIE refers to the real value of commodities imported and exported within the border of China. FDI refers to foreign investment in China through the establishment of invested enterprises and establishment of branch organizations of foreign enterprises. FDI data are translated into Chinese currency (RMB) according to the exchange rate of the year to which it belongs. VIE data are the year's published figures denominated in RMB. LBP, FDI, and VIE data are inflation-adjusted accounting with 2010 prices.

The followings hypotheses are proposed:

- Hypothesis 1: In China, there is a long-term stable equilibrium relationship among IND, URB, GLB and LBP.
- Hypothesis 2: There exists a mutual influence between URB and LBP.
- Hypothesis 3: There exists a mutual influence between IND and LBP.
- Hypothesis 4: There exists a mutual influence between FDI and LBP.
- Hypothesis 5: There exists a mutual influence between VIE and LBP.

The data for this study are collected from Annual Data during 1978-2016 (National Bureau of Statistics of China, 2017). To reduce the volatility of data and heteroscedasticity, the natural logarithm of each variable is labeled as LNLBP, LNIND, LNURB, LNVIE, and LNFDI. The statistical description of the variables is shown in Table 1.

TABLE 1
STATISTICAL DESCRIPTION OF THE VARIABLES

Variables	Sample size	Mean	Standard deviation	Minimum	Maximum
LNLBP	39	9.828086	0.848755	11.31332	8.588955
LNIND	39	4.392264	0.103334	4.515723	4.207889
LNURB	39	3.495825	0.349704	4.049168	2.88565
LNVIE	39	9.828497	2.140514	12.48462	5.872118
LNFDI	39	6.621113	2.588261	9.032325	1.177685

Unit-root Test

Since there is a spurious regression in the non-stationary series, this study draws upon an augmented Dickey–Fuller test (ADF) Unit-root test developed by Dickey and Fuller (1979) to perform a stationary test of explanatory variables. Results in Table 2 show statistic of LNLBP, LNURB, and LNVIE are more than critical value at 5% level, indicating that the three series are non-stationary series. It needs to do the second order differential processing. After the second order difference of five series, the ADF test is conducted. The results show that they are stationary series. Thus LNLBP, LNIND, LNURB, LNVIE, and LNFDI are integrated of order one in the Model 1. The stationary time series variables indicate their mean, variance, autocorrelation is constant over time.

TABLE 2
UNIT-ROOT TEST OF VARIABLES

	Test form(c ,t ,k)	ADF statistic	5% level	Prob.*	Stationarity
LNLBP	(c,t,1)	0.808177	-2.943427	0.9929	Instationary
LNIND	(c,t,0)	-4.463247	-3.536601	0.0055	Stationary
LNURB	(c,t,1)	-0.551562	-2.943427	0.8693	Instationary
LNVIE	(c,t,0)	-2.843342	-2.941145	0.0618	Instationary
LNFDI	(c,t,1)	-3.355641	-2.943427	0.0193	Stationary
D(LNLBP)	(c,t,0)	-3.871591	-3.536601	0.0235	Stationary
D(LNIND)	(c,t,0)	-5.783763	-3.536601	0.0002	Stationary
D(LNURB)	(c,t,0)	-4.423707	-3.536601	0.0061	Stationary
D(LNVIE)	(c,t,0)	-5.058052	-3.536601	0.0011	Stationary
D(LNFDI)	(c,t,0)	-4.463247	-3.536601	0.0055	Stationary

Notes: In(c, t, k), c is the constant term; t is the trend term; k is the lag.
* indicates significant at 5% level, respectively.

Vector Autoregression Model

Since the test result of AIC (Akaike Information Criterion), SC (Schwarz Criterion), HQ (Hannan-Quinn Information Criterion), and FPE (Final Prediction Error) are inconsistent, this study uses LR (Likelihood Ratio) test to determine the optimal lag length of vector autoregression (VAR) Model 1, and uses OLS (Ordinary Least Squares) to estimate the model. The results are as follows:

$$LNLBP = 0.767228357427 + 0.921870891476\ LNLBP_{t-1} - 0.12260056717\ LNIND_{t-1} + 0.0948212976101\ LNURB_{t-1} + 0.0314554954368\ LNVIE_{t-1} - 0.00453826475511\ LNFDI_{t-1} + e_{1t} \quad (2)$$

$$LNIND = 1.59338505109 - 0.0641862188324\ LNLBP_{t-1} + 0.601893356533\ LNIND_{t-1} + 0.203059637615\ LNURB_{t-1} + 0.00437902629381\ LNVIE_{t-1} + 0.00591048871207\ LNFDI_{t-1} + e_{2t} \quad (3)$$

$$LNURB = - 0.343024852252 + 0.0311643197933\ LNLBP_{t-1} + 0.0830814948598\ LNIND_{t-1} + 0.950107967742\ LNURB_{t-1} - 0.0172877413559\ LNVIE_{t-1} + 0.00706945398919\ LNFDI_{t-1} + e_{3t} \quad (4)$$

$$LNVIE = - 6.0174672578 - 0.603208375019\ LNLBP_{t-1} + 1.54118147719\ LNIND_{t-1} + 2.32583638686\ LNURB_{t-1} + 0.663794512\ LNVIE_{t-1} + 0.0784775019885\ LNFDI_{t-1} + e_{4t} \quad (5)$$

$$LNFDI = 13.3742779177 - 0.789053573545\ LNLBP_{t-1} - 2.75146056839\ LNIND_{t-1} + 1.40253374688\ LNURB_{t-1} + 0.232999109915\ LNVIE_{t-1} + 0.919621974939\ LNFDI_{t-1} + e_{5t} \quad (6)$$

All of the *t*-statistics of model parameters are significant; meanwhile the goodness of fit of equations is as follows and it shows that the overall goodness of fit of the equation is high. R^2 is the coefficient of determination. R^2 >0.95 indicates that the relevant equation is significant (MacDonald & Kearney, 1987). R^2 values are shown below:

R^2_{LNLBP}=0.998199, R^2_{LNIND}=0.987589, R^2_{LNURB}= 0.998990, R^2_{LNVIE}= 0.997066, R^2_{LNFDI}=0.992360.

Johansen Cointegration Test

In this study, we have applied the Johansen (1990) tests for counteraction. The lag order of VAR model is 1, and LNLBP, LNIND, LNURB, LNVIE, and LNFDI are integrated of order one, so this research use Johansen test to determine the number of cointegration vector in the model. The test results are in Table 3. The result indicates that there is a cointegration relationship among the five-time series LNLBP, LNIND, LNURB, LNVIE, and LNFD. This result means that in China, there is a long-term stable equilibrium relationship among IND, URB, GLB and LBP. This result can prove that the hypothesis 1 is valid.

TABLE 3
JOHANSEN COINTEGRATION TEST RESULT

The null hypothesis: the number of cointegration equations	Trace test			Maximum eigenvalue test		
	Statistic	5% critical value	Pro**	Statistic	5% critical value	Pro**
None*	142.7040	69.81889	0.0000	70.85363	33.87687	0.0000
At most 1 *	71.85042	47.85613	0.0001	32.83967	27.58434	0.0096
At most 2 *	39.01075	29.79707	0.0033	24.81616	21.13162	0.0144
At most 3	14.19460	15.49471	0.0778	10.95224	14.26460	0.1566
At most 4	3.242356	3.841466	0.0718	3.242356	3.841466	0.0718

* denotes reject the hypothesis at the 5% level of significance.

** denotes reject the hypothesis at the 1% level of significance.

Granger Causality Test

In this study, Granger (1987) causality test determines whether one time series is useful in forecasting another. This test detects the causal relationship among LNLBP, LNIND, LNURB, LNVIE, and LNFD, and the results are shown in Table 4.

TABLE 4
GRANGER CAUSALITY TEST - LAGS: 1

Null Hypothesis:	Sample size	F-Statistic	Prob.	
(a) LNURB does not Granger Cause LNLBP	38	2.82638	0.1016	Rejected
(b) LNLBP does not Granger Cause LNURB		0.89145	0.3516	Rejected
(c) LNIND does not Granger Cause LNLBP	38	0.82912	0.3688	Rejected
(d) LNLBP does not Granger Cause LNIND		0.59257	0.4466	Rejected
(e) LNFDI does not Granger Cause LNLBP	38	2.18519	0.1483	Rejected
(f) LNLBP does not Granger Cause LNFDI		1.93821	0.1726	Rejected
(g) LNVIE does not Granger Cause LNLBP	38	3.21326	0.0817	Accepted
(h) LNLBP does not Granger Cause LNVIE		1.89516	0.1774	Rejected
(i) LNURB does not Granger Cause LNFDI	38	0.88443	0.3534	Rejected
(j) LNFDI does not Granger Cause LNURB		0.86383	0.3590	Rejected
(k) LNURB does not Granger Cause LNVIE	38	0.02598	0.8729	Rejected
(l) LNVIE does not Granger Cause LNURB		0.26690	0.6087	Rejected
(m) LNFDI does not Granger Cause LNVIE	38	2.82532	0.1017	Rejected
(n) LNVIE does not Granger Cause LNFDI		0.80878	0.3746	Rejected
(o) LNFDI does not Granger Cause LNIND	38	15.0566	0.0004	Accepted
(p) LNIND does not Granger Cause LNFDI		3.67092	0.0636	Accepted
(q) LNIND does not Granger Cause LNVIE	38	0.63946	0.4293	Rejected
(r) LNVIE does not Granger Cause LNIND		18.0383	0.0002	Accepted
(s) LNURB does not Granger Cause LNIND	38	5.35468	0.0267	Accepted
(t) LNIND does not Granger Cause LNURB		1.59064	0.2156	Rejected

Table 4 indicates, in the case of lag 1, the following are concluded:

1. There exists a mutual Granger causality between URB and LBP as shown in rows (a) and (b). There exists a mutual Granger causality relationship between IND and LBP as shown in rows (c) and (d). There exists a mutual Granger causality relationship between FDI and LBP as shown in rows (e) and (f).
2. VIE does not Granger cause LBP as shown in row (g), but LBP does Granger cause VIE as shown in row (h). These results proved the hypothesis 2, hypothesis 3 and hypothesis 4 are valid, but the hypothesis 5 is not valid (rejected).
3. There exists a mutual Granger causality relationship between URB and FDI as shown in rows (i) and (j). There exists a mutual Granger causality between URB and VIE as shown in rows (k) and (l). There exists a mutual Granger causality relationship between FDI and VIE as shown in rows (m) and (n).
4. VIE does not Granger cause LBP as shown in row (r).

CONCLUSION, DISCUSSION AND IMPLICATION

This study examined the economic indexes, such as GDP, GDP per capita, the structure of GDP, and LBP in China. It explored the cointegration and causal relationships among IND, URB, VIE, FDI, and LBP, using time series data for China over the period 1978-2016. The results indicate that there are cointegrating relationships among the variables of this study. This implies that the explanatory variables such as IND, URB, VIE and FDI are coalescing with LBP to achieve their steady-state equilibrium in the long run. The results reveal that the economic growth in China has been accompanied by IND, URB, and GLB in the recent 40 years while LBP has also risen. The results also indicated that URB does Granger cause LBP, VIE, and FDI as shown in rows (a), (i), and (k) of Table 4. In the process of China's URB, the agglomeration effects of cities on technology and human capital and the provision of better education and medical services have promoted the improvement of LBP. The massive housing and infrastructure construction in the process of URB consume huge amounts of raw materials such as iron ore, copper, and crude oil, and a large part of these raw materials rely on imports (Chen & Zhang, 2016). The export processing zones continue to appear around the cities and produce a large number of export products. China's URB has brought economic growth and the improvement of people's living standard that has led to tremendous internal demands and has attracted FDI.

IND does Granger cause LBP, VIE, and URB as shown in rows (c), (q), and (t) of Table 4. IND has been fueled by dramatic LBP growth (Kim & Topel, 1995). In the process of IND in China, a large amount of surplus rural labor force has entered the industrial and service sectors and the LBP in these sectors has increased far higher than agriculture. Therefore, as the share of non-agricultural industries in the GDP rises, the LBP also rises simultaneously. With the improvement of IND level, especially the competitiveness of manufacturing sectors, China has achieved a large export in the fields of home appliances, automobiles, and personal computers. IND is the process of transforming the traditional agricultural society into a modern industrial society. As a large number of rural laborers enter the cities and employed in manufacturing and service sectors that promoted the URB process.

FDI does Granger cause LBP, URB, and VIE as shown in rows (e), (j), and (m) of Table 4. FDI benefits innovation activity in the host country via spillover channels such as reverse engineering, skilled labor turnovers, demonstration effects, and supplier-customer relationships (Cheung, 2004). FDI has accelerated economic growth and promoted URB by increasing the demand for labor. Exports created by foreign-invested enterprises are predominantly products assembled from imported parts and components. In addition, many Chinese firms are also involved in processing exports using parts and components supplied by or purchased from foreign firms (Zhang & Song, 2003).

VIE does Granger cause URB and FDI as shown in rows (l) and (m) of Table 4. Increase in export has intensified the demand for labor force and prompted more rural labor force to enter the cities (Lardy, 1995). Imported advanced equipment, technology, and raw materials can reduce the cost of URB and accelerate the URB. More imports into China will lead to more inward FDI from the home country, which in turn, will lead to more exports from China to the home country (Liu, et al., 2001).

LBP does Granger cause URB, IND, FDI, and VIE as shown in rows (b), (d), (f), and (h) of Table 4. In the late 1970s and early 1980s, the reform involved de-collectivization of agriculture, which improved China's agricultural LBP. The release of a large number of peasants from the rural areas into cities has promoted URB (Tang, 2017). In China, there are different levels of LBP in different sectors. Capital, labor and other elements of production will shift from the low LBP sectors to the high LBP sectors, thus deepen the IND (Zhang, 2010). Low wage is no more a favorable factor for FDI inflows. However, the higher levels of LBP from skilled workers are the more favorable factor for FDI. Relying on the competitive advantages formed by high labor productivity can occupy a larger share of the international market (Li, 2006).

VIE does not Granger cause LBP as shown in row (r) of Table 4. The average productivity of exporting businesses is lower than non-exporting one because of productivity paradoxes (Tang, et al., 2011). In China, roughly a fifth of exporters which is engaged in processing trade account for about onethird of total export value. These firms are 4% to 30% less productive than non-exporters (Dai, et al., 2016).

Based on the above analysis, we make the following recommendations: at present, China's agricultural LBP is still low. In 2016, 27.8% of China's total employed population engaged in agriculture, but they only created 8.6% of GDP (NBS, 2017). China should increase agricultural LBP speedily to release agricultural surplus labor force. In 2016, as the world factory, the value added by manufacturing industry in China has ranked the number one in the world, and accounts for more than one-fifth of the world's total (Tang, 2017). However, although the proportion of China's manufacturing industry is larger than that of the United States, its LBP is only 1/6 of that of the United States (Geng, 2016). This shows that China's manufacturing industry is large but not strong. Promoting the quality and efficiency of the manufacturing industry is an inevitable requirement of China's industrial upgrading. In 2016, China's LBP in service industry was 85.9% of it in the manufacturing industry. In 2015, the proportion of service industry in GDP is also low, only 50.2%. This proportion is less than many developed countries, such as the United States (78.9%), Japan (69.7%), Germany (68.5%), and the United Kingdom (79.3%) (World Bank, 2018). We suggest that China focus on strengthening the development of service sectors such as business services, scientific research, technical services, and health-related services that currently have relatively high added-value; upgrade the technology of service sectors, and constantly improve service efficiency. In 2016, China's urban permanent population as a percentage of the total population is 57.3%, the level of URB is still low. From these data, there is still much room for improvement in China's LBP, IND, and URB. Furthermore, China's LBP growth, IND and URB require higher degree of GLB. It not only needs to import the technologies, high-end equipment for IND, but needs to import the raw materials and energies as well. China still relies on the international market to sell its products, and relies on FDI to promote its industrial upgrading.

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REFERENCES

Acemoglu, D. (1996). A microfoundation for social increasing returns in human capital Accumulation. *Quarterly Journal of Economics,* 111(3), 779 – 804.

Alam, A., et al. (2013). Relationship of Labor Productivity, Foreign Direct Investment and Economic Growth: Evidence from OECD Countries. *Journal of Business and Management Sciences,* 1, 133 – 138.

Altıok. M., & Tuncer, I. (2012). Türkiye İmalat Sanayinde Yapısal Değişim ve Üretkenlik: 1980 – 2008 Dönemi. *Acta Chromatographica,* 23(1), 69 – 80.

Alvarez-Cuadrado, F., & Poschke, M. (2011). Structural change out of agriculture: Labor push versus labor pull. *American Economic Journal: Macroeconomics,* 3(3), 127 – 158.

Atesoglu, H. S. (1994). An application of a Kaldorian export-led model of growth to the United States. *Applied Economics,* 26, 479 – 483.

Bai, X., Krishna, K., & Ma, H. (2017). How you export matters: Export mode, learning and productivity in China. *Journal of International Economics,* 104, 122 – 137.

Baldwin, R., E. (2004). On the growth effects of import competition. *Social Science Electronic Publishing,* 40(9), 1784 – 1797.

Bairoch P., & Kozul, W. R. (1998). Globalization myths: some historical reflections on integration industrialization and growth in the world economy. In: Kozul-Wright R., Rowthorn R. (eds.), *Transnational corporations and the global economy.* Palgrave Macmillan, London.

Beckerman, W. (1965). Demand, exports and growth. In: Beckerman W and Associates (eds.), *The Britain Economy in 1975,* The National Institute of Economics and Social. Research, Series 23, Cambridge UK: Cambridge University Press, 44 – 72.

Bloch, H., & McDonald, J. T. (2001). Import competition and labour productivity. *Journal of Industry Competition and Trade,* 1, 301 – 319.
Bhandari, A. K., & Heshmati, A. (2005). Measurement of Globalization and Its Variations Among Countries, Regions and Over Time. *IZA Discussion Paper* No. 1578.
Broadberry, S., & Harrison, M. (2005). *The economics of World War Ⅰ*. Cambridge: Cambridge University Press.
Brückner, M. (2012). Economic growth, size of the agricultural sector, and urbanization in Africa. *Journal of Urban Economics,* 71(1), 26 – 36.
Chen, Z., & Zhang, G. (2016). China urbanization, income inequality and import trade. *Journal of Industrial Technological & Economics,* 267(1), 130 – 138.
Cheung, K., & Ping, L. (2004). Spillover effects of FDI on innovation in China: Evidence from the provincial data. *China economic review,* 15, 25 – 44.
Ciccone, A., & Hall, R. E. (1996). Productivity and the density of economic activity. *American Economic Review,* 86(1), 54 – 70.
Dai, M., Maitra, M., & Yu, M. (2016). Unexceptional exporter performance in China? The role of processing trade. *Journal of Development Economics,* 121, 177 – 189.
Delgado, M., et al. (2012). *The Determinants of National Competitiveness.* Retrieved, December 18, 2017, From https://www.researchgate.net/publication/236903847_The_Determinants_of_National_Competitiveness
Deng, X., Huang, J., Rozelle, S., & Uchida, E. (2008). Growth, population and industrialization, and urban land expansion of China.*Journal of Urban Economics,* 63(1), 96 – 115.
Dickey, D.A., & Fuller, W.A. (1979). Distribution of the estimators for the autoregressive time series with a Unit Root. *Journal of the American Statistical Association,* 79, 355 – 367.
Friedmann, J. (2006). Four Theses in the Study of China's Urbanization. *International Journal of Urban & Regional Research,* 30(2), 440 – 451.
Fujita, M., & Hu, D. (2001). Regional disparity in China 1985–1994: The effects of globalization and economic liberalization. *The Annals of Regional Science,* 35, 3 – 37.
Geng, D.W. (2016). Comparative research of China-US industry structure and labor productivity differences, *Development Research,* 10, 11-15
Granger, C. W. J. (1969, May). Investigating causal relations by econometric models and cross spectral methods. *Econometric,* 37, 424 – 43.
Granger, C. W. J., & Newbold, P. (1974, July). Spurious regressions in econometrics. *Journal of Econometrics,* 2, 111 – 120.
Granger, C.W.J., & Engle, R.F. (1987). Cointegration and error correction: representation, estimation and testing. *Journal of the Econometric Society,* 55(2), 251 – 276.
Grasso, P.G., & Sharkansky, I. (1980). Economic development and the distribution of income in the American states. *Social Science Quarterly,* 61, 446 – 457.
Gu, C. I., Hu L. Q., & Cook, I. G. (2017). China's urbanization in 1949–2015: processes and driving forces. *Chinese Geographical Science,* 27(6), 847 – 859.
Gygli, S., Haelg, F., & Sturm, J. (2018). The KOF Globalisation Index – Revisited, *KOF Working Paper,* No. 439.
Hamer, A. M., & Linn, J. F. (1987). Urbanization in the developing world: patterns, issues, and policy. *Handbook of regional and urban economics,* 2(6), 1255 – 1284.
Henderson, J. V. (2010). Cities and development. *Journal of Regional Science,* 50(1), 515 – 540.
Hogeland, J. (2013). From agrarian to global values: how 20th century U.S. agricultural cooperatives came to terms with agricultural industrialization. *Journal of Rural Cooperation,* 41(2), 97 – 113.
Huff, G., & Angeles, L. (2011). Globalization, industrialization and urbanization in pre-World War II Southeast Asia. *Explorations in Economic History,* 48, 20 – 36.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics,* 52(2), 169 – 210.

Kim, D., & Topel, R. (1995). Labor market and economic growth: lessons from Korea's industrialization, 1970 – 1990. In: *Richard Freeman and Lawrence Katz. (eds.), Difference and changes in wage structures.* Chicago: University of Chicago Press.

Kozan, M. K. (1993). Cultural and industrialization level influences on leadership attitudes for Turkish managers. *International Studies of Management & Organization,* 23(3), 7 – 17.

Kuijs, L., & Wang, T. (2006). China's Pattern of Growth: Moving to Sustainability and Reducing Inequality China & World Economy. *China & World Economy,* 14(1), 1 – 14.

Lardy, N. R. (1995). The role of foreign trade and investment in China's economic transformation. *The China Quarterly,* 144, 1065 – 1082.

Li, C. (2006). Traditional advantages in attracting FDI to face the challenge: an empirical research on Shanghai in China*. Finance & Trade Economics,* 12, 77 – 82.

Li, K., et al. (2011). Privatization and Risk Sharing: Evidence from the Split Share Structure Reform in China. *The Review of Financial Studies,* 24(7), 2499 – 2525.

Liu, X., Liu, X., Wang, C., & Wei, Y., (2001). Causal links between foreign direct investment and trade in China. *China Economic Review* 12, 190 – 202.

Liu, X., Li, L., & Liu, Y. (2014). The collaborative relationship among industrialization, urbanization, informatization and agricultural modernization and the path of synchronous development in China: an analysis based on the data during 1978-2011. *Asian Agricultural Research,* 6(10), 6 – 11.

Liu, T., Su, C., & Jiang, X. (2015). Is economic growth improving urbanisation? A cross-regional study of China. *Urban Studies,* 52(10), 1883 – 1898.

Long, G. (2005). China's policies on FDI: review and evaluation, in Moran, T H, Graham, E. M., Graham and Blomstrom, M. (eds.), *Does foreign direct investment promote development?* Washington DC, Peterson Institute for International Economics.

MacDonald, R., & Kearney, C. (1987). On the specification of granger-causality tests using the cointegration methodology*. Economics Letters,* 25(2), 149 – 153.

McCullough, E., B. (2017). Labor productivity and employment gaps in Sub-Saharan Africa. *Food Policy,* 67, 133 – 152.

McMillan, M., & Rodrik, D. (2014). Globalization, structural change, and productivity growth, with an update on Africa. *World Development,* 63, 11 – 32.

Michaels, G., Rauch, F., & Redding, S.J. (2012). Urbanization and structural transformation. *Quarterly Journal of Economics,* 127(2), 535 – 586.

National Bureau of Statistics of China (2017). *Annual Data.* Retrieved, December 15, 2017, from http://data.stats.gov.cn/english/easyquery.htm?cn=C01

NBS (National Bureau of Statistics of China). (2017). *Statistical Communique of the People's Republic of China on the 2016 National Economic and Social Development.* Retrieved, February 28, 2017, from http://www.stats.gov.cn/english/PressRelease/201702/t20170228_1467503.html

Ramirez, M. (2000). Foreign direct investment in Mexico: a cointegration analysis. *The Journal of Development Studies,* 37(1), 138 – 162.

Rodrik, D. (2006). What's So Special about China's Exports? *China & World Economy,* 14(5), 1 – 19.

Rosenthal, S., & Strange, W. C. (2004). Evidence on the nature and sources of agglomeration economies. In J.V. Henderson and J-F Thisse (eds.), *Handbook of Urban and Regional Economics,* Vol. 4, Cities and Geography, North Holland.

Shukur, G., & Mantalos, P. (2000). A simple investigation of the Granger-causality test in integrated-cointegrated VAR systems. *Journal of Applied Statistics,* 27, 1021 –1031.

Spence, M., Annez, P.C., & Buckley, R.M. (2009). *Urbanization and growth.* Washington, DC: The World Bank.

Tang, E., Li, Y., & Zhang, H. (2011). Heterogeneity enterprise, exports and productivity paradox, based on the evidence of manufacturing enterprise in China in 2007. *Nankai Economics Studies,* 3, 79 – 96.
Tang, Z. (2017). *China's urbanization and socioeconomic Impact.* Singapore: Springer Nature Singapore Pte Ltd.
UNIDO (United Nations Industrial Development Organization). (2013). *Industrial Competitiveness of nation: Looking back, forging ahead.* Vienna: United Nations.
Wagner, J. (2002). The causal effects of exports on firm size and labor productivity: first evidence from a matching approach. *Economics Letters,* 77(2), 287 – 292.
WB and DRCC (World Bank and Development Research Center of China). (2014). *Urban China: Toward efficient, inclusive, and sustainable urbanization.* Washington DC: World Bank.
World Bank (2018). *Services, etc., value added.* Retrieved, March 16, 2018. From https://data.worldbank.org/indicator/NV.SRV.TETC.ZS?view=chart
Yamada, H. (1998). A note on the causality between export and productivity: an empirical re-examination. *Economics Letters,* 61, 111 – 114.
Zhang, K. H. (2010). How does globalization affect industrial competitiveness? *Contemporary Economic Policy,* 28 (4), 502 – 510.
Zhang, K. H. (2017). Urbanization and industrial development in China. In: Tang Z. (eds.), *China's urbanization and socioeconomic impact.* Springer, Singapore.
Zhang, K., & Song, S. (2003). Rural–urban migration and urbanization in China: evidence from time-series and cross-section analyses. *China Economic Review,* 14, 386 – 400.
Zhang, Z. (2006). Relation between Chinese industrialization level and environmental quality. *Finance & Economics,* 2, 47 – 54.
Zheng, L., Batuo, M.E., & Shepherd, D. (2017). The impact of regional and institutional factors on labor productive performance—evidence from the township and village enterprise sector in China. World Development, 96, 591 – 598.
Zhou, Y., & Ma, LJC. (2003). China's urbanization levels: reconstructing a baseline from the fifth population census. The China Quarterly, 173, 176 – 196.