

# CHINA - A ROBOTIZING EAST-ASIAN DEVELOPMENTAL STATE, ITS RELATION TO THE USA, EU AND CEE – OR WILL CHINA BECOME CHIN-AI?

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## Abstract

In our paper we explain China's dynamic development in the field of digitalization, artificial intelligence and industrial robotization by extending the term of developmental state. We first examine the concept of developmental state from the 1950s up until the era of globalization (strong state-weak society, market-based economy pursuing export-oriented industrial policy), and then we go on to examine the state of robotization in the era of post-globalization. We discuss how robot density is linked to multiple factors such as low TFR, high per capita GDP or developmental state.

China was the leading force in technology 500 years ago. We examine the possibility of a once again rising China claiming the lead in the field of technological advances.

Studies show that only the USA will be able to match the speed of automatization and robotization of China up until 2025. By that date, the GDP of China will amount to the sum of the GDP of the EU and the United States. CEE countries may take part in a Chinese push for more global power by the 17+1 formula, while China approaches the CEE countries (which are considered to be the gate to the EU) via the Shanghai – Istanbul – Moscow axis. The level of development of the CEE countries has an impact on their robot density, which is basically determined by German automotive industry and less by their national industry 4.0 initiatives. Whether a Chin-AI era is coming or not, we cannot say for sure.

**Keywords:** China, developmental state, artificial intelligence, deglobalization, robot density

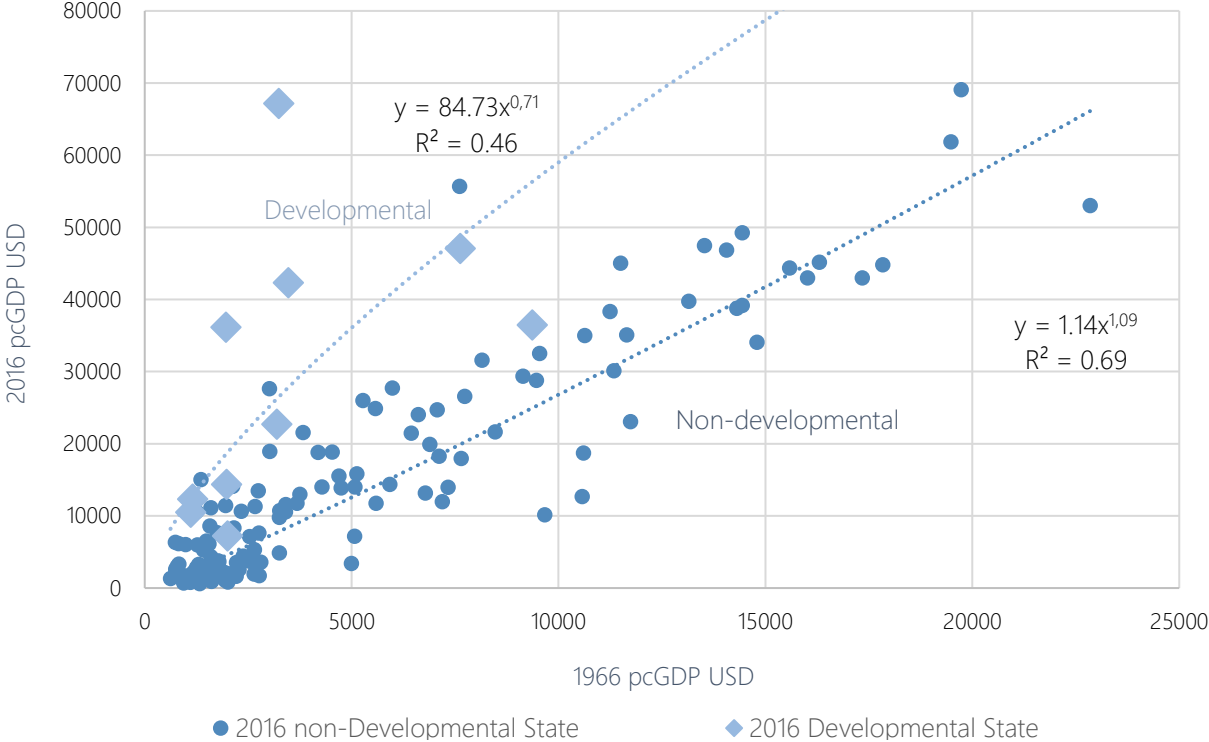
## 1. Introduction

There are necessarily many approaches to China and digitalization. In this paper, we approach the question from a special perspective, extending the concept of the East Asian developmental state to China, which may help to explain the accelerated pace of robotization. We first analyze the issue of the developmental state as an authoritarian system pursuing export-oriented industrial policy from the 1950s to the end of the period of globalization. Afterwards we examine the situation of post-globalization robotics. Finally, we look at the question of the decades ahead, including geopolitical challenges and answers.

## 2. The Developmental State in Economic Literature

The East Asian so called developmental countries' GDP grew almost twice as fast as the average of the "world GDP" over 50 years (1966-2016), and have shown a rise from poverty to middle-income and in some cases to wealthy countries. Many scholars are debating the question whether China will ever reach the wealthy country club. Others are asking, if China indeed becomes a wealthy country with its huge population, then will it become also the new leader that "replaces" the US and leads the world according to its own rules? The rise of the "digital leader" People's Republic of China would embody the hope of many and the fear of others. We deal with this question in Chapter 4 and 5., in Chapter 2 and 3. we analyze the real economic situation and the challenges of the recent years and present days. Figure 1. shows that the economic growth of the developmental states was more rapid than that of non-developmental states.

Figure 1:  
GDP/cap in developmental and non-developmental states, 1966 - 2016



Source: Maddison Project Database, 2018.

Between 1966 and 2016, the median rate of GDP per capita on an average increased yearly by 2.7% in the non-developmental states and by 5.0% in the developmental states. The figures in the table allows the division of non-developmental states into several groups. To do this we use a 2x2 matrix of states and societies.

Table 1:  
GDP/cap in developmental and non-developmental states in 1966 and 2016

	1966	2016		1966	2016		1966	2016		1966	2016
Singapore	3237	67180	Portugal	5978	27726	Egypt	1951	11430	Cambodia	822	3307
Hong Kong	7621	47043	Malta	3011	27612	Albania	2662	11285	Bangladesh	1299	3250
Taiwan	3470	42304	Cyprus	7732	26540	Sri Lanka	1593	11118	Kenya	1597	3214
Japan	9364	36452	Poland	5266	26002	Mongolia	1107	11105	Lesotho	782	3015
Korea	1962	36151	Seychelles	5574	24856	Saint Lucia	3256	10737	Cameroon	1247	2803
Malaysia	3191	22687	Greece	7064	24689	Tunisia	2331	10621	Nepal	745	2586
Thailand	1971	14341	Hungary	6610	24047	Bosnia, H.	1247	10576	Senegal	2279	2544
China	1151	12320	Russian Fed.	11739	23064	Ecuador	3396	10536	Tanzania	1825	2518
Indonesia	1106	10511	Croatia	8467	21625	Barbados	9664	10160	Yemen	1180	2199
Philippines	1997	7223	Panama	3827	21538	Dominica	3248	9773	Chad	1316	2192
Luxembourg	19727	69057	Chile	6435	21446	Paraguay	1573	8605	Benin	1531	2166
Switzerland	19478	61844	Uruguay	6890	19896	El Salvador	2156	8335	Gambia	2693	1950
Ireland	7607	55653	Romania	3020	18913	Swaziland	1749	7641	Afghanistan	2642	1929
United States	22842	53015	Mauritius	4528	18852	Morocco	2757	7613	Uganda	1379	1909
Netherlands	14436	49254	Turkey	4187	18784	Jamaica	5071	7175	Rwanda	724	1741
Saudi Arabia	13523	47474	Argentina	10598	18695	Guatemala	2531	7137	Zimbabwe	2760	1729
Germany	14055	46841	Montenegro	7109	18244	Cabo Verde	1487	6512	Comoros	1703	1713
Denmark	16303	45141	Bulgaria	7645	17953	Lao	736	6324	Guinea	1494	1668
Austria	11495	45010	Mexico	5124	15803	Myanmar	816	6139	Ethiopia	969	1659
Australia	17834	44783	Iran	4690	15529	Bolivia	1546	6118	Haiti	2204	1636
Sweden	15584	44371	Botswana	1357	15015	Viet Nam	988	6031	Mali	1015	1604
Iceland	16011	42980	Gabon	5921	14334	India	1272	5961	Burkina Faso	1992	1561
Canada	17334	42969	Dominic. R	2119	14088	Nigeria	2650	5323	Togo	1615	1515
Belgium	13142	39733	Serbia	4281	14001	Pakistan	1421	5250	Guinea-B.	1294	1354
Un. Kingdom	14440	39162	Costa Rica	5074	13986	Nicaragua	3252	4872	Madagascar	1180	1307
France	14304	38758	Iraq	7325	13976	Honduras	2380	4435	Mozambique	622	1288
Finland	11238	38335	Macedonia	4745	13887	Congo	1599	4310	Sierra Leone	1932	1070
Puerto Rico	11643	35082	Brazil	2738	13479	Ghana	2377	3753	Malawi	1156	950
Italy	10632	34989	Venezuela	6778	13159	Sudan	1776	3750	Niger	1609	906
New Zealand	14796	34040	Colombia	3747	12963	Côte d'Ivo.	2551	3664	Congo	2006	836
Israel	9536	32494	Lebanon	10565	12683	S. Tome, P	1790	3640	Liberia	1103	764
Spain	8144	31556	South Africa	7191	11949	Syrian AR	2801	3557	Burundi	935	692
Czechoslovakia	11336	30118	Jordan	3673	11748	Zambia	2216	3538	Central AR	1328	619
Trinidad, Tob.	9135	29358	Namibia	5584	11741	Djibouti	4989	3394			
Slovenia	9459	28761	Peru	3409	11540	Mauritania	1592	3307			

Source: Maddison Project Database, 2018.

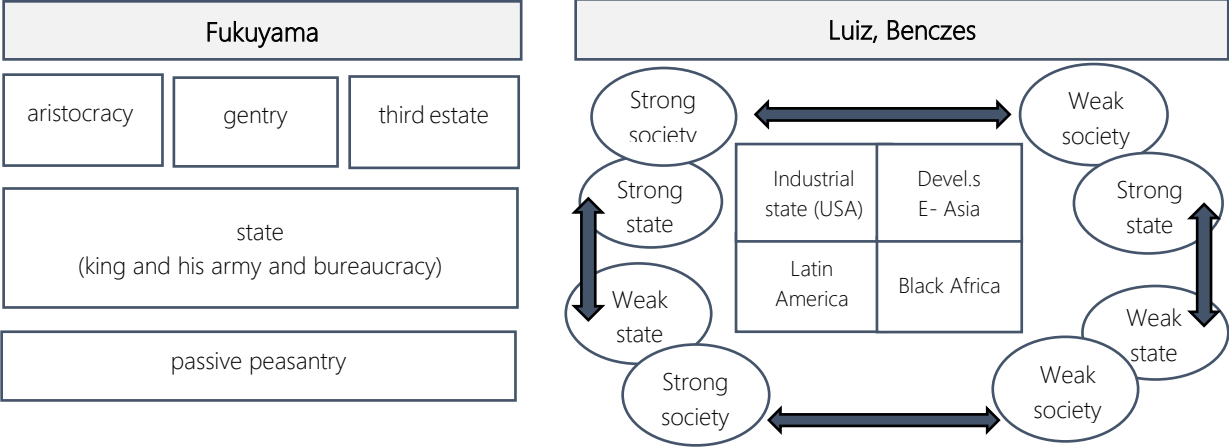
According to Luiz (2000), countries may be classified into the following groups:

- a) strong state – strong society (e.g. EU, USA),
- b) weak state – weak society (e.g. Black Africa),
- c) weak state – strong society (e.g. Latin-America),
- d) strong state – weak society (e.g. East Asia)

Fukuyama (2011) used this classification for the Middle Ages and Modern Europe in the following way: the state: a king with an army and bureaucracy; society made up of aristocrats and other noblemen, and city citizens; peasants: 90% of the population provided the passive bases for the changing ruling system above them.

If we want to depict the half-century period, we find that African states have largely remained in the "start-up square", while developmental states have grown faster than "normal countries" and much faster than Latin-American economies.

Figure 2:  
State and Society Scheme in the feudalism and afterward



Sources: edited by the author based on Fukuyama, 2011; Benczes, 2009.

The East Asian developmental state model (Japan, Korea, Singapore, Thailand, and Republic of China (RoC) – and Peoples’ Republic of China (PRoC) included by many) had ten main components (Riciz, 2018):

1) **Economic nationalism and social mobilization.** The state forces quick reconstruction after World War II, focusing on industrialization with the purpose of economic convergence, but also requiring the mobilization of society.

2) **A strong, centralized, authoritarian state** is led by a narrow, determined elite committed to long- term development policy; their intervention is always pragmatic, and their activity can be characterized as a long learning process. The state expects international competitiveness in the selected industrial sectors in exchange for state support. The state enforces market principles. The authoritarian type state’s development model is effective in setting goals as well as using measures and indications to achieve them (e.g.: suppression of labor, low wages, stable economic policies independent of political cycles). The legitimacy of the system relies on shared growth.

3) **Extensive state interventionism.** The state makes plans (in a discretionary and selective way), controls (prices, exchange rates, interest rates), fine-tunes, selects the winners, and manages the transition from import substitute to export-oriented economic structure. The market rationality is limited in line with industrial goals, and incentives, licenses and indications reduce the risk of investors. The selected strategic industries are supported, the rest of the economy functions within the framework of market competition.

4) **Extended business groups.** Family businesses with traditions implement state oriented industrial policy, and their social (e.g.: lifelong employment, education, health) and political role (e.g.: giving the system legitimacy for political, economic, financial support) is also important.

5) **Meritocratic bureaucracy** has a historical tradition in East Asia. Its members are carefully selected by competency and values (e.g.: system of competitions, committed to the public good), they also understand the signals of the private sector and market because they have an extensive and living network of information.

6) **Agriculture after the land reform.** The increase in agricultural productivity provides the basis for the forced industrial development and for the integrated, balanced and controlled development of rural-urban areas. Large landowners are exiled from the socio-political arena, which promotes the social support and background for the developmental state system.

7) **Export-oriented economic development strategy** is implemented under state control, some say with market comfort tools (Johnson), others say with market distortion (Amsden, 1989) and with market management (Wade, 1990), but in any case, in a (foreign)market-friendly manner. "One eye always focuses on the world market."

8) **Repressive financial system:** Developments are financed by domestic resources: savings and investments are mainly stimulated and channeled through fiscal instruments to specific industries. The State's guarantee for deposits is an incentive to save. State aid provides lifelong employment in loss-making companies in the selected sector. Safe operation of financial institutions has been achieved by regulated market entrance conditions rather than applying strict rules (foreign financial institutions are not welcomed). Closed, subordinated capital markets. The approach to foreign capital is negative, while domestic savings and capital investments enable rapid growth without foreign capital inflow or with strongly filtered foreign capital inflow (Japan, Korea, RoC).

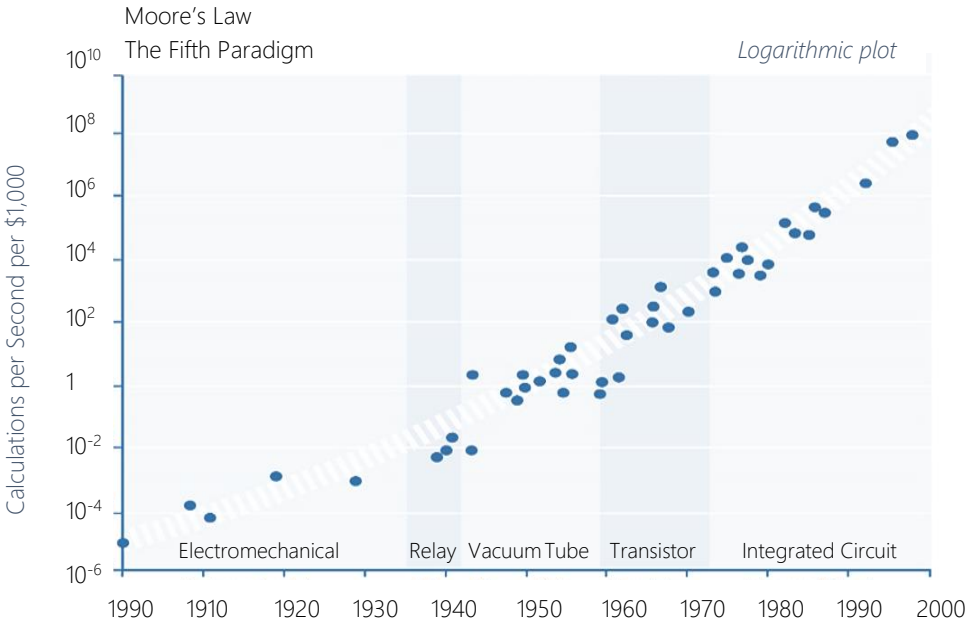
9) **Macroeconomic stability.** Stable, predictable business environment, low inflation, prudent fiscal and monetary policies, and stable, competitive exchange rates.

10) **Shared growth.** Relatively homogeneous societies, strong sense of community and social cooperation based on the ethos of the nation/nationalism, significant economic growth, poverty and GINI decline, HDI indicators improve.

### 3. The Dawn of the Developmental State in the Era of Globalization and Afterward

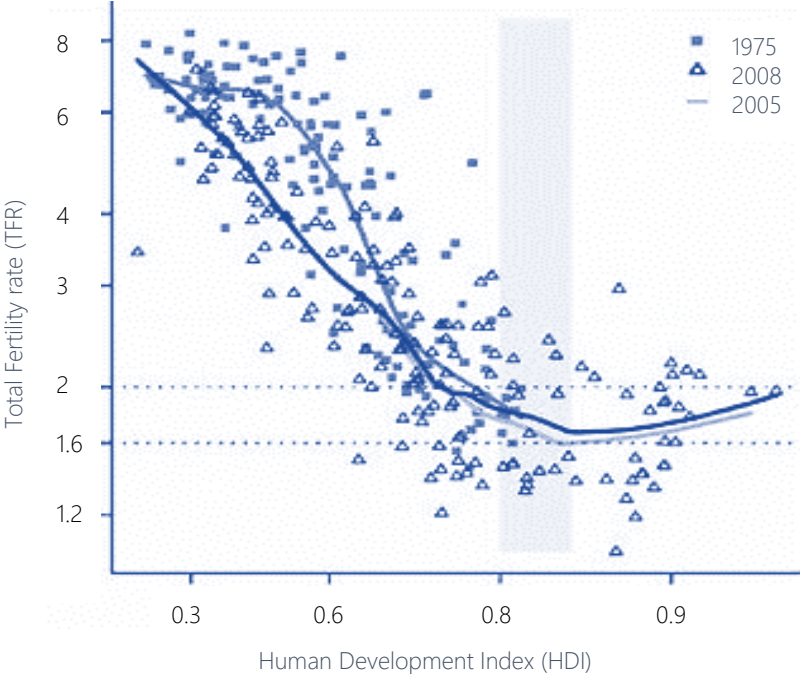
The vast majority of literature believes that the developmental state is no longer a viable model in the age of globalization (when the export-to-GDP ratio increases significantly, due, among others, to almost complete eradication of customs). The greater portion of population has already moved from the countryside into cities, and no longer can be easily subordinated by autocratic rule. Entry to the country is allowed for foreign financial institutions, and free flow of capital is slowly making it impossible for strong state to intervene, while on the other hand society has strengthened. A new element is the twin processes of declining total fertility rate since the 1970s (TFR below 2.1 in many developed and semi-developed countries), and rapid digitalization allowing cheap machine computing (Moore's Law: the transistor density doubles every two years).

Figure 3:  
 Moore's Law: the transistor density doubles every two years 1900 – 2000



Source: Kurzweil, 2005.

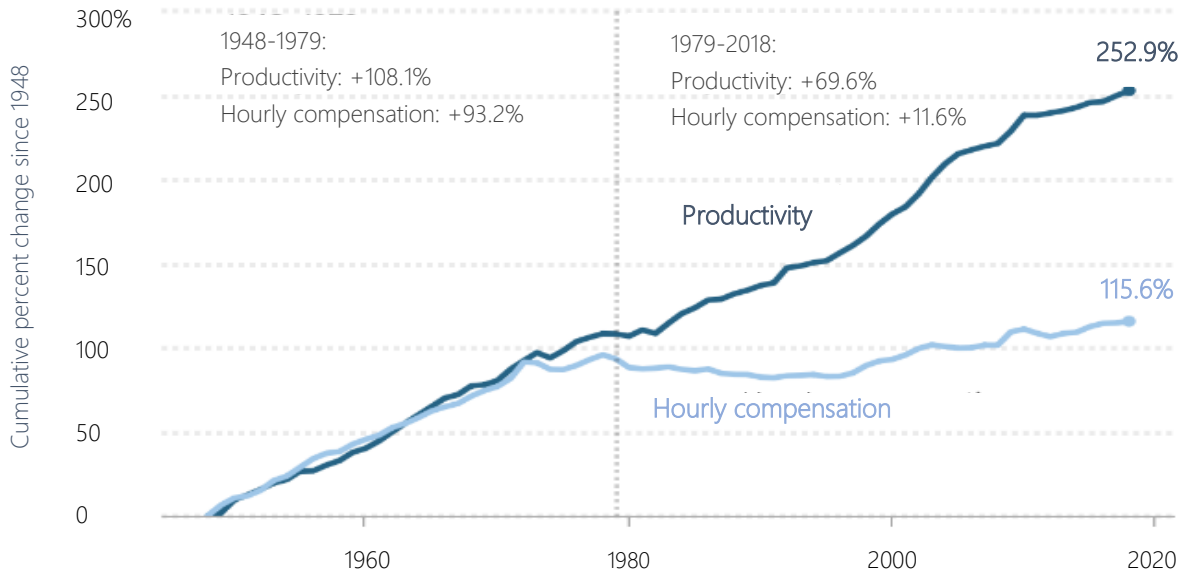
Figure 4:  
 Cross-country relationship between Total Fertility Rate (TFR) and Human Development Index (HDI), years 1975, 2005 and 2008



Source: Myrskylä et al., 2011.

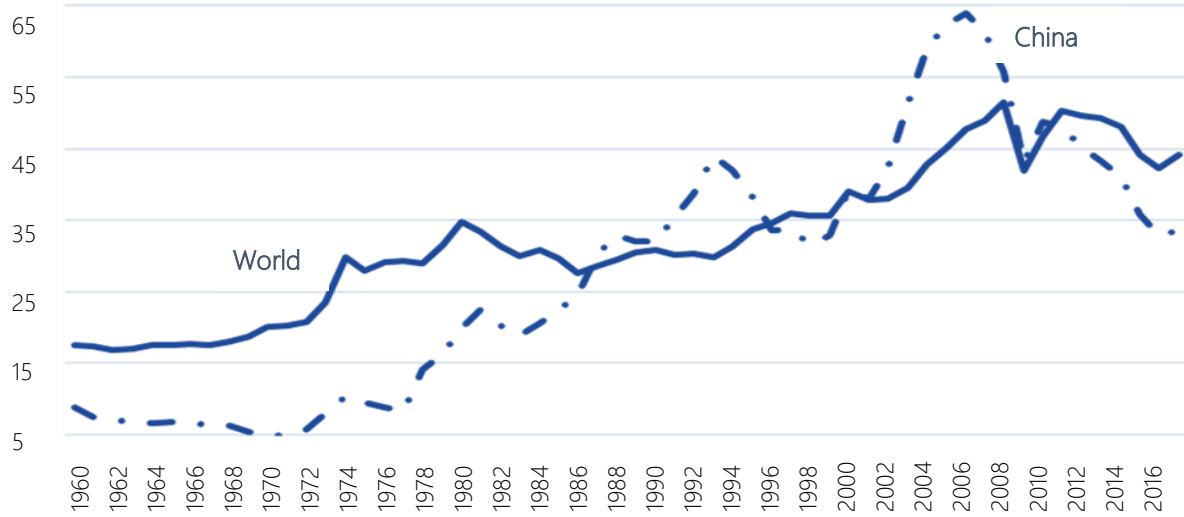
In the US, productivity increased after 1970 until 2008, as it did from 1870, but the real wages of blue-collar workers remained unchanged after the 1980s. It was cheaper to outsource production (Stolper-Samuelson theorem, 1941) or to robotize production (the costs of robots are much lower than German wages, while the robots don't get sick and do not strike).

Figure 5:  
Divergence of American productivity and blue-collar hourly wages since 1979



Source: Economic Policy Institute, 2017.

Figure 6:  
Global and Chinese export/GDP grew from 1960 to 2005, but stagnates from 2005



Source: The World Bank Data, 2018.

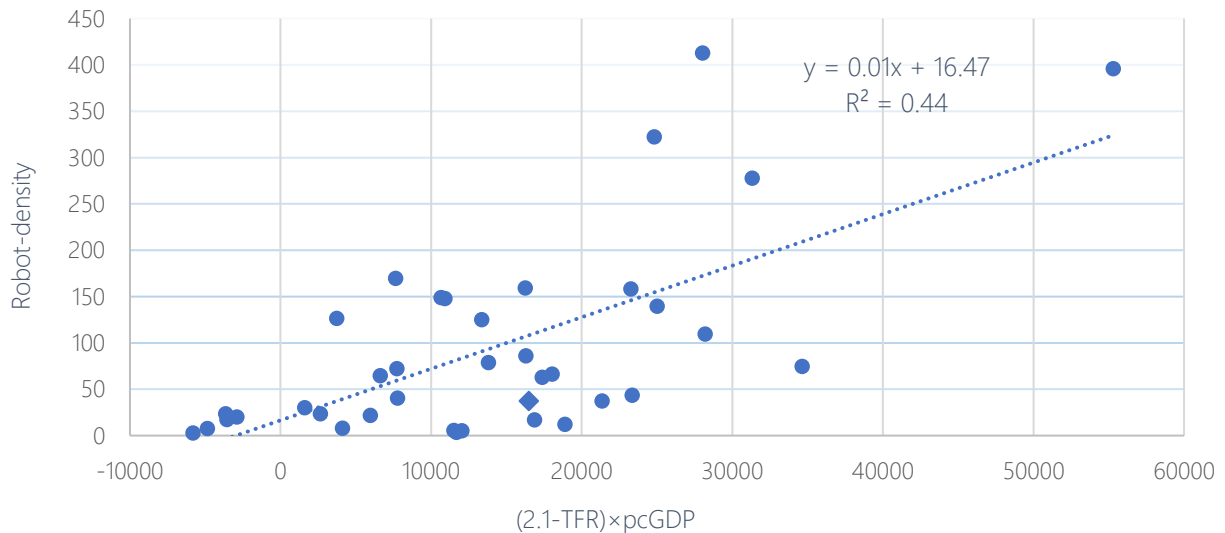
To sum it up: around 2005, the dynamics of globalization stopped, with robotic sales increasing by 15% yearly and robot density (robot/manufacturing worker) rising sharply. However, robotization has not been spreading evenly around the world. Let's look at the full picture first. Let's examine the assumption that there is a positive relationship between the GDP loss due to the unborn population (low (under 2.1) fertility rate  $[(2,1-TFR) \times pcGDP]$ ) and the robot density (RD). Overall, though not very strong, this relationship can be discovered over the period of 2010-2015.

Table 2:  
TFR, GDP and Robot Density in selected countries (2010-15)

	TFR	pcGDP	(2,1 TFR) xpcGDP	Robot- density		TFR	pcGDP	(2,1 TFR) xpcGDP	Robot- density
S. Korea	1.26	33369	28030	413	Slovenia	1.37	23802	17375	63
Singapore	1.23	63562	55299	396	Norway	1.80	77845	23354	43
Japan	1.40	35446	24812	322	Thailand	1.53	13632	7770	41
Germany	1.39	44104	31314	278	Portugal	1.28	26050	21361	37
Sweden	1.92	42435	7638	170	Hungary	1.34	21720	16507	37
Denmark	1.73	43916	16249	159	New Zealand	2.05	32321	1616	30
Italy	1.43	34727	23267	158	Indonesia	2.50	9097	-3639	23
United States	1.89	50742	10656	149	Malaysia	1.97	20302	2639	23
Belgium	1.82	38957	10908	148	China	1.55	10858	5972	22
Spain	1.32	32076	25019	140	Mexico	2.29	15224	-2893	20
France	2.00	37307	3731	126	South Africa	2.40	11851	-3555	17
Finland	1.75	38191	13367	125	Poland	1.37	23110	16870	17
Australia	1.47	44778	28210	110	Greece	1.34	24868	18900	12
Netherlands	1.75	46539	16210	89	Brazil	1.82	14683	4111	8
Slovenia	1.58	26548	13805	79	Argentina	2.35	19449	-4862	8
Switzerland	1.52	59716	34635	75	Romania	1.48	18555	11504	6
Austria	1.92	42985	7737	72	Estonia	1.59	23599	12035	5
Czechia	1.45	27449	17842	67	Croatia	1.52	20137	11679	4
United Kingdom	1.92	36757	6616	65	Philippines	3.04	6190	-5819	3

Source: own compilation based on IFR World Robotics, 2017; Maddison Project Database 2018, and World Population Prospects, 2019.

Figure 7:  
Robot density as a function of GDP loss (low TFR), 2010-2015



Source: IFR World Robotics, 2017; Maddison Project Database, 2018; and World Population Prospects, 2019.

Now, let's look at this relationship a little deeper, in relation to the East Asian developmental state type countries.



Table 3:

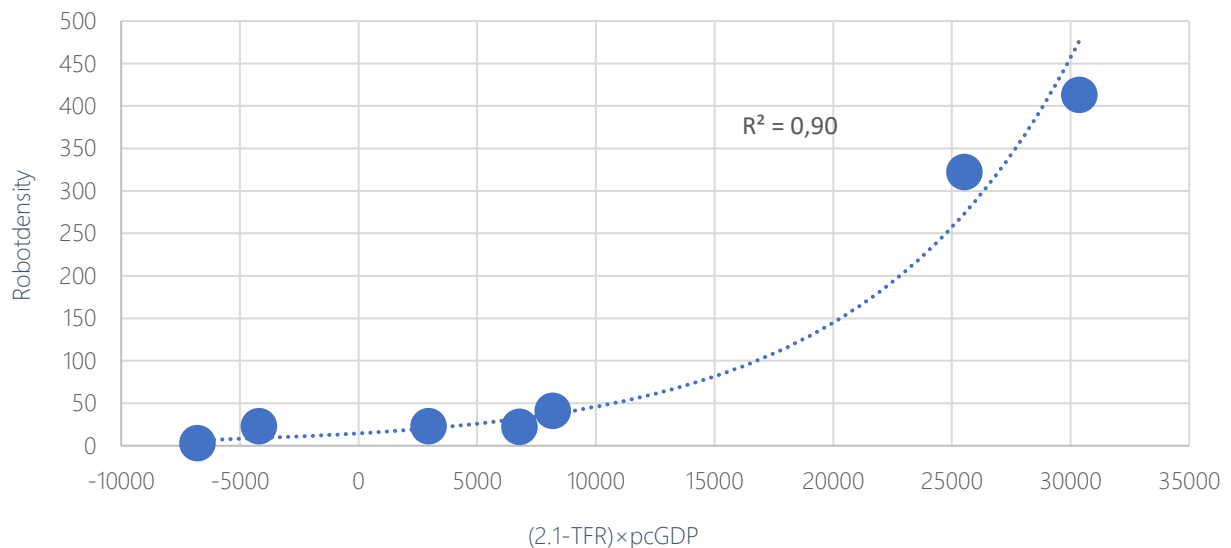
TFR, GDP loss, RD of selected countries in developmental states type countries

	TFR	(2,1-TFR) xpcGDP	RD
Japan	1.4	25516	322
Korea	1.26	30367	413
Malaysia	1.97	2949	23
Thailand	1.53	8174	41
China	1.55	6776	22
Indonesia	2.5	-4204	23
Philippines	3.04	-6790	3

Source: IFR World Robotics, 2017; Maddison Project Database, 2018; and World Population Prospects, 2019.

Figure 8:

Robot density as a function of GDP loss in 7 East-Asian developmental state, 2010-2015



Source: IFR World Robotics, 2017; Maddison Project Database, 2018; and World Population Prospects, 2019.

In the case of East Asian developmental states, there is a stronger relationship between robot density and GDP loss (low TFR). Let's see if developmental states show higher or lower robot density at the same level of development. The Bold (7,18,21,22,26,31,35,39,40) are the developmental states, those not in bold contains some CEE countries that are members of China+17 in the framework of BRI.

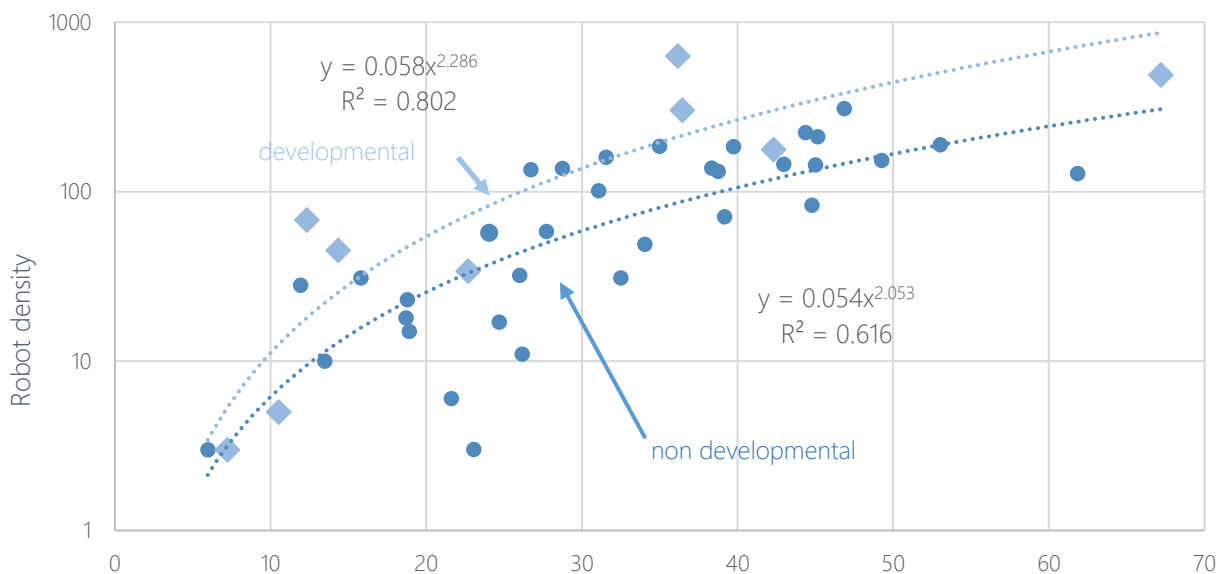
In Figure 9 the diamonds are the developmental states and the circular points are the others. 18 countries' population decreased over the 20 years between 1996 and 2006: Puerto Rico and the post-socialist European countries: Albania, Serbia, Montenegro, Bulgaria, Romania, Croatia, Hungary, Poland, Estonia, Latvia, Lithuania, Russia, Belarus, Ukraine, Moldova, Armenia, Georgia. From the Western Balkans upwards along the post-Soviet border, and down into the Black Sea region, we find a region, where the results can be seen of an uncompensated (by migrants) population outflow and a declining TFR.

Table 4:  
GDP, RD of East Asian development state, CEE and other states

	2016	pcGDP \$	RD-nDS	RD-DS		2016	pcGDP \$	RD-nDS	RD-DS
1	Argentina	18695	18		23	Mexico	15803	31	
2	Australia	44783	83		24	Netherlands	49254	153	
3	Austria	4501	144		25	New Zealand	3404	49	
4	Belgium	39733	184		<b>26</b>	<b>Philippines</b>	<b>7223</b>		<b>3</b>
5	Brazil	13479	10		27	Poland	26002	32	
6	Canada	42969	145		28	Portugal	27726	58	
<b>7</b>	<b>China</b>	<b>1232</b>		<b>68</b>	29	Romania	18913	15	
8	Croatia	21625	6		30	Russian Fed.	23064	3	
9	Czech Rep.	31089	101		<b>31</b>	<b>Singapore</b>	<b>6718</b>		<b>488</b>
10	Denmark	45141	211		32	Slovakia	26713	135	
11	Estonia	26173	11		33	Slovenia	28761	137	
12	Finland	38335	138		34	South Africa	11949	28	
13	France	38758	132		<b>35</b>	<b>South Korea</b>	<b>36151</b>		<b>631</b>
14	Germany	46841	309		36	Spain	31556	160	
15	Greece	24689	17		37	Sweden	44371	223	
16	Hungary	24047	57		38	Switzerland	61844	128	
17	India	5961	3		<b>39</b>	<b>Taiwan</b>	<b>42304</b>		<b>177</b>
<b>18</b>	<b>Indonesia</b>	<b>10511</b>		<b>5</b>	<b>40</b>	<b>Thailand</b>	<b>14341</b>		<b>45</b>
19	Israel	32494	31		41	Turkey	18783	23	
20	Italy	34989	185		42	United King.	39162	71	
<b>21</b>	<b>Japan</b>	<b>36452</b>		<b>303</b>	43	United Stat.	53015	189	
<b>22</b>	<b>Malaysia</b>	<b>22687</b>		<b>34</b>					

Source: IFR World Robotics, 2017; Maddison Project Database, 2018; and World Population Prospects, 2019.

Figure 9:  
GDP, Robot Density of East Asian developmental states, CEE and other states, 2016



Source: IFR World Robotics, 2017; Maddison Project Database, 2018; and World Population Prospects, 2019.

The East Asian developmental states are more robot-sensitive and capable of robotizing their economics much faster than others. Post-globalization robotization seems to once again favor the East Asian model of strong state-weak society. It is no coincidence that Japan is still a one-party political system. In 95% of the elections, the LDP comes to power. (Some CEE countries are approaching this robotics path, including countries where the state is growing stronger and society is weakening, but the East Asian model is not a reality here because of the retentivity of being an EU member, while the US doesn't care. The CEE countries meet robots mainly in German owned automotive factories, while the robotization of domestic economies within the framework of Industry 4.0 is still only a plan.)

The technical development of China for six hundred years (up to 1500) has produced astounding results (Mokyr, 1990). Not only the technical improvement in rice production, but the invention of paper, porcelain, printing, gunpowder and rockets, watches, compasses, iron making in blast furnaces, and the construction of huge ships that were made with compartment technology centuries ahead of European shipbuilding (Acemoglu – Robinson, 2012).

Table 5:  
China's Competitiveness in the 14<sup>th</sup> century (measured, by WEF GCI)

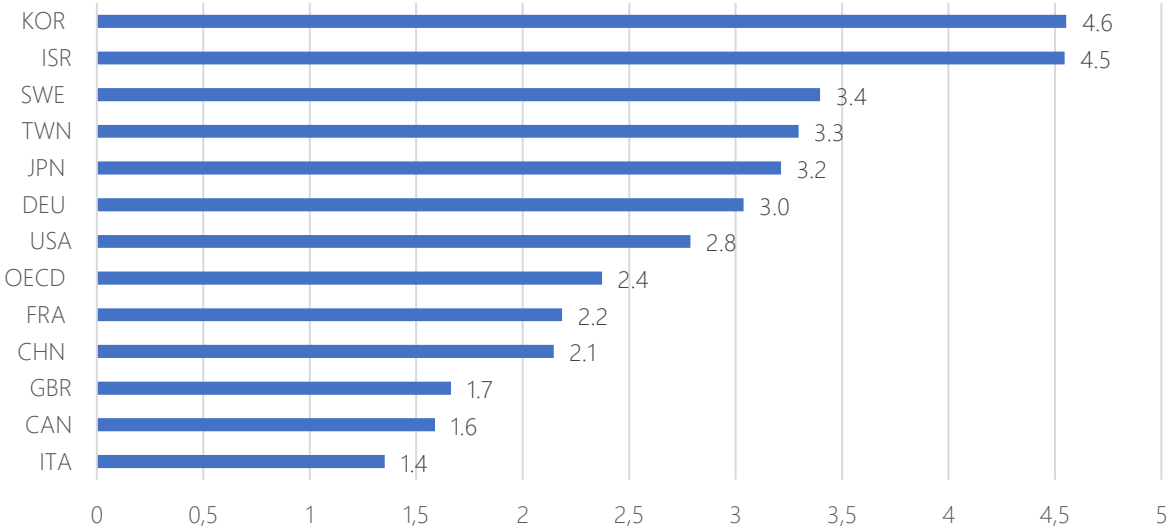
China in the 14 <sup>th</sup> century	
1. Institutions	centralized state, ideology: Confucianism
2. Infrastructure	developed transportation including road and sea transport
3. Macroeconomic environment	single market
4. Health and primary education	developed health care system including the improvement of autopsy
5. Higher education and training	higher education institutions, state exams were introduced BC II. century
6. Goods market	higher level of specialization in agriculture, e.g.: 16 different types of rice
7. Labor market	manors and tenants of remote arable parcels
8. Financial market	financial reform, "mercantilism", banknotes were invented, usury
9. Technology	agriculture reform: barrage, tall-gate
10. Market size	developed international trade, single market
11. Business sophistication	diversified business structure, decentralization of decisions
12. Innovation	banknotes, missile, compass

Source: own compilation

The Chinese fleet also embarked on exploration of far seas in East Africa (Aden). The sea explorations and innovations, previously encouraged by the emperor, were banned around 1500 because the emperor and his bureaucracy decided on deflecting the country from demoralizing outer impressions. There were many sovereign kingdoms in Europe, and if someone did not like the leadership of a country, then one could go to another country and continue experimenting and discovering. England was particularly fortunate, with the introduction of patent law and the banking system in the 1740s, fulfilling the Schumpeterian dual requirement for successful innovation. (England: it has become rewarding to invent something under legally secured circumstances and having the opportunity to find financing for it).

The current Chinese concept of innovation may be radically different from that of the 16th century. China's R&D expenditures to GDP rate is between France's and Britain's, lagging behind Germany but ahead of Italy, and only half a percentage point lower than the four times richer US', but less than half of the two leading R&D countries (Korean Republic and Israel).

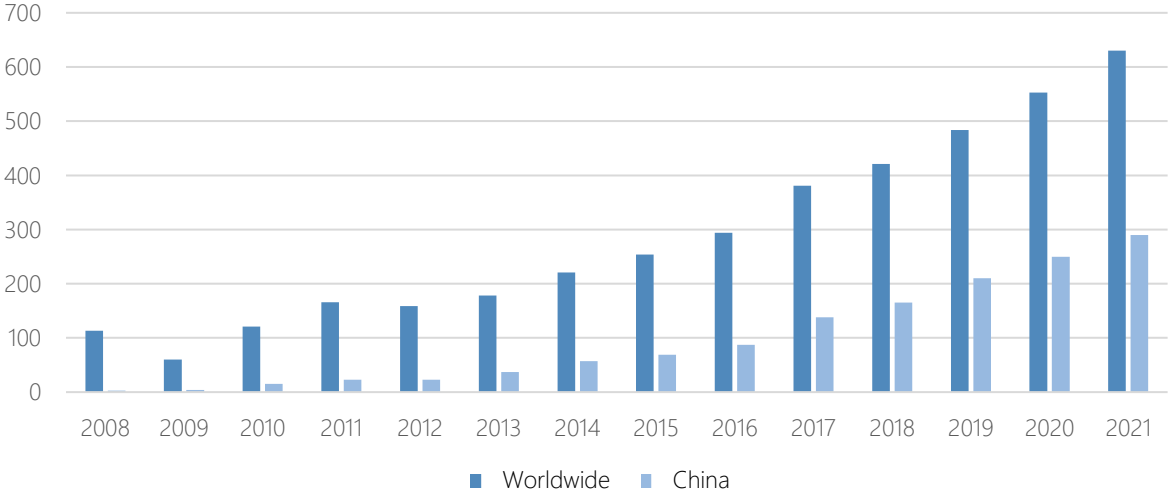
Figure 10:  
Gross domestic spending on R&D, Total, % of GDP, selected countries, 2017



Source: OECD Data, 2017.

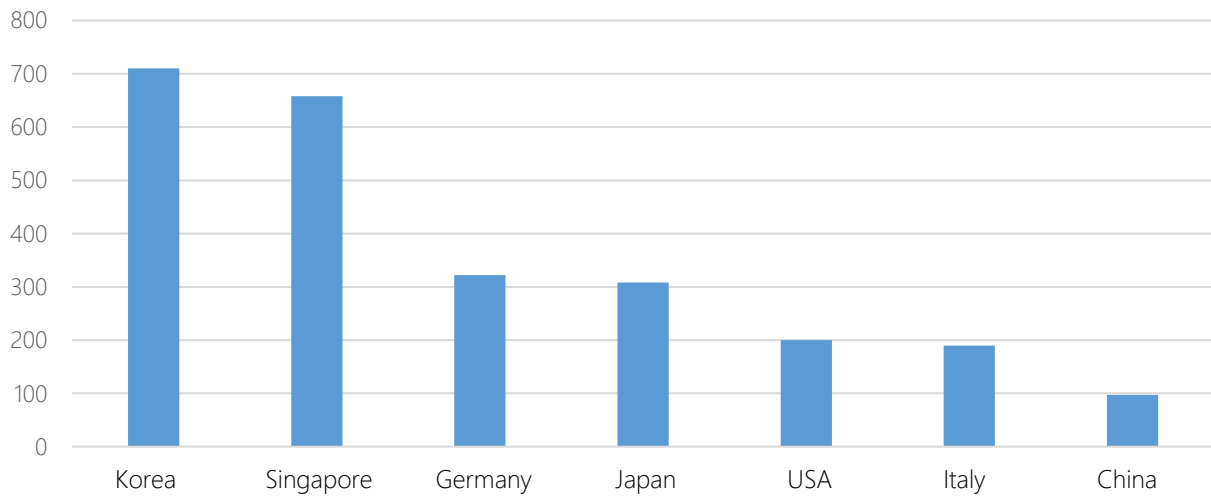
The sharply rising number of industrial robots in China is beyond all imagination. If the growth rate of robotization that characterized China in the last decade is maintained, then China's annual demand for robots (from imports and domestic production) will be the same as the rest of the world in 2023 (increasing by nearly 30% year on year since 2010). The annual average growth rate of robotization in North America is close (20.4%) to that of China (22.1%). According to expert estimates the average annual growth rate will lag in Germany with 7.1%, with 8.7% in Japan, and with 9.4% in Republic of Korea between 2015 and 2025.

Figure 11A:  
Growth of Industrial Robotics, Estimated Annual Supply of Industrial Robots 2008-2021



Source: IFR World Robotics, 2018.

Figure 11B:  
Robot Density, Robots per 10,000 Manufacturing Employees, 2008



Source: IFR World Robotics, 2018.

#### 4. Possible Future of China until 2100

China is stirring up everyone's imagination, one of the world's oldest civilizations. The population of the People's Republic of China compared to the world is significant, albeit declining in the 21<sup>st</sup> century.

Table 6:  
Population of China and the rest of the world, 1950-2100

	1950	2015	2030	2050	2100
World (million)	2525	7350	8501	9725	11213
China (million)	544	1376	1416	1348	1004
China	22%	19%	17%	14%	9%
	1975-80	2005-10	2015-20	2045-50	2095-2100
TFR World	3.87	2.56	2.47	2.25	1.99
TFR China	3.01	1.53	1.59	1.74	1.81

Sources: UN, 2017, World Population Prospects, figures rounded

The UN (2015) estimates that the world population will exceed 11 billion in 2100 and then begin to decline, as the total fertility rate (TFR) remains below 2.1 for reproduction. China's population will nearly triple between 1950 and 2030 and will decline by one-third in the next 70 years. In 1950, China's population accounted for nearly a quarter of the world's population, falling to less than a tenth by the end of the 21<sup>st</sup> century. The global fertility rate for the world population was 3.87% in 1950, which has fallen by 1.99% over a century and a half and has not increased since. China succeeded in reducing its TFR from 3.01% to 1.53% between 1975-80 and 2005-10, in a single generation, and it will not increase to 2.1 – which means that its population is shrinking. Demographers have found that along with the rise of HDI (Human Development Index: GDP, education and healthcare system) the TFR rates typically fall to a low level, then rise slowly, but not reaching the reproduction level of 2.1. China is thus facing a shrinking and aging population (60+ in 2015: 16.8%, 2100: 56.1%), while its GDP was 115% of the US's in 2016 and will be 162% by 2030 and 172% by 2050.

Table 7:  
GDP ranking of China and top 10 countries of the world 2016-2050

GDP PPP rankings	2016 rankings		2030 rankings		2050 ranking	
	Country	GDP at PPP	Country	Projected GDP at PPP	Country	Projected GDP at PPP
1	China	21269	China	38008	China	58499
2	United States	18562	United States	23475	India	44128
3	India	8721	India	19511	United States	34102
4	Japan	4932	Japan	5606	Indonesia	10502
5	Germany	3979	Indonesia	5424	Brazil	7540
6	Russia	3745	Russia	4736	Russia	7131
7	Brazil	3135	Germany	4707	Mexico	6863
8	Indonesia	3028	Brazil	4439	Japan	6779
9	United Kingdom	2788	Mexico	3661	Germany	6138
10	France	2737	United Kingdom	3638	United Kingdom	5369

Source: PWC, 2017.

The PWC estimates that China's GDP per capita in 2016 was about a quarter of the US's and will be half by 2050. If we look at the question from a different angle, then in 2050 the US and EU will produce approximately as much as China's GDP alone (21% and 20% of world GDP, respectively). China is assertively and self-consciously preparing to become the world's leading power in three decades. This scenario could be averted by an Atlantic Alliance with the European Union and the United States (EUSA), but world politics is not necessarily heading in that direction (Brexit, Trump). The recurring idea of geopolitics is the encirclement policy, which could have a new dimension if the EUSA Alliance and its "natural" democratic allies (India, Japan, Korea, Australia, and many others) intend to regulate the "heartland trio" of China, Russia, and Iran. The three countries try to hinder this process with new waterways, land-based trade roads and gas-oil pipelines. (Meanwhile, the Earth may boil over in the climate crisis, water and food shortages may occur, but robots, artificial intelligence and big data techniques can redraw everything.)

## 5. Relations between Digitalization and Silk Road (BRI)

Let us start this phase with a geopolitical introduction. After World War I., the US did not engage in active foreign policy until the Japanese attack in Pearl Harbour on December 7, 1941, and a few days later Hitler declared war. From that point China was considered as an American allied and received some support. A few years after the war, the sons of the two nations fought each other in the bloody Korean war. According to the doctrine of Guam island, the Reds (Communists) must be stopped where they penetrate. In line with this doctrine, the US fought and bombed Vietnam, provoking disapproval of much of the world. In 1972 China decided to turn toward the US against Soviet pressure, a move that was welcomed by Nixon. Within a decade China began its great economic march, often at double-digit GDP growth rates relying on export, domestic savings, joint ventures and investments. China's goal was to step forward gradually on the production chain with increasing production and trade. BRI (according to American fears) is a multi-faceted initiative, which helps to absorb the excessive capacities of construction and steel production in China. China provides credit to African countries, supplying China with raw materials, and to less developed EU members, facilitating efficient access to the export market. For a long time, America was delighted to have ended the Vietnam War, and believed that China was detaining the Russians. After the Cold War the US began their international democratization project with some anti-terrorist glaze. Under the Obama administration

attempts were made to financially enclose China. The US threatened “bad” countries by imposing financial penalties instead of military operations and using its allies. The US has blamed China and Russia for creating saving gluts, which led to the outbreak of the financial crisis of late 2007. It was at this time when W. Mitchell developed the concept of enclosure of the three dangerous countries (China, Russia, and Iran). According to the concept the US should support the border countries of the enclosure (independently of whatever they do at home). In this concept, the BRI and the assisting international development institutes (NDB, AIIB, Silk Road Fund) mean an outbreak attempt from the enclosure that should be prevented by the US with every means necessary.

From a Chinese point of view, the BRI is collecting allies, is utilizing excessive capacities, is providing work for Chinese and foreign workers and is channeling existing Chinese financial reserves into a world where the US can no longer be a hegemonic power. If the decades of US’ hegemony are over, what is next? There are several scenarios for it:

- a) A Kantian world state - this is the dream of European and American humanists;
- b) Integration of developed democracies to the world which is led by China-fears among Rust Belt’s Republican Party fans;
- c) New Economic and Cyber Cold War – according to those who were born in the mid-20<sup>th</sup> century;
- d) BRI: larger NATO member nations worry about China connecting Europe, Asia and Africa by financial and transportation means.

In 1820, China’s GDP per capita reached 41% of the US’s, it was 4.1% in 1950, and 24% in 2016, in 2050 it will reach approximately 50% of it. When the first Sputnik was launched there was great fear in the US that the Russians would be world leaders, but the economic growth of the one-party Russian planned economy soon faded. There were fears that Japan would be the challenger power. Japan bravely used market and government instruments with a specific Japanese political set-up and won productivity competitions in many (but not all) areas. But the golden ages were followed by a slow down with remarkable domestic debt and high-age dependency. Is there any internal brake in the economy of China that prevents it from becoming the “new leader”? The contemporary American strategic thinkers say it is dangerous if the renminbi becomes the key currency, not to mention that China can build up strategic positions in Europe through the BRI and with the help of Russia. Some American geopolitical experts fear that China will re-think the multi-political system model of one or more cities and countries.

## 6. Digitalization as the Supporter of Trade and E-Commerce

The global export/GDP ratio (one of the main indicators of globalization) began to increase at a rapid rate (in the 1970s) when digitalization came out. If we look back 200 years in time, we can see that every 10<sup>th</sup> person’s livelihoods stood on firm ground, whereas nowadays only every 10<sup>th</sup> person is endangered by poverty. The success of sequential technical revolutions – the steam engine, internal combustion engines, electricity and digitalization – have brought such wealth. Previously, these revolutions were accompanied by the widening of the income gap between countries, but with the rise of digitalization, the gap, although still huge, began to narrow.

Have we listed all the important features of the relationship between digitalization and export rate? “Digitalizing everything we can” has led to an important new development path in the framework of today’s industry 4.0.

According to the half a century old Moore's Law there is a robust decreasing in the cost of processing one bit of data, year by year. Today is the age of robots that our great-grandparents and grandparents just imagined, robots have become an industrial service provider. The digitalization of the past half century can also be regarded as the story of a gradually narrowing gap of costs between an expensive robot and cheap (export-producing) workforce. In the meanwhile, e-commerce opportunities have increased market opportunities by a magnitude. (The needed socks or cell phones can be ordered with two clicks from anywhere in the world where they are manufactured, put on ships or trains for about a quarter of the store price.) Fortunately, the number of poor people in the world is declining and median wages are similarly rising for exporter countries, while stagnating for importers (following the almost same predictions that Stolper made in his article nearly 80 years ago).

According to our current knowledge, industrial robot sales are growing at 15% per year, while exporters' wages are rising significantly. After 2010 this may have contributed to stagnation or in some cases decline of the (formerly dynamically growing) global export/GDP ratio. Can we do something to prevent the two twin children of digitalization (e-commerce and robotization) from eating each other? We can do it because trade with specialization always provides an opportunity, all it takes is for the old form of trade (of goods) to change and to transform into more of a trade of ideas. It is well-known that the United States – at a particular stage of Japan's and Korea's development in the 1950s, 60s and 70s – treated generously intellectual property laws because of the Cold War. The interests of the United States, country of innovation, was to make Japan and Korea more competitive allies against the Soviet Union in the geopolitical framework of enclosed Moscow. The US behaved quite differently with its main opponent, the Soviet Union. According to a joke from the 1980s, the COCOM list even forbade Eastern European stores from buying a modern import copy machine; in order to prevent the Soviet Union from reusing the chips for other purposes.

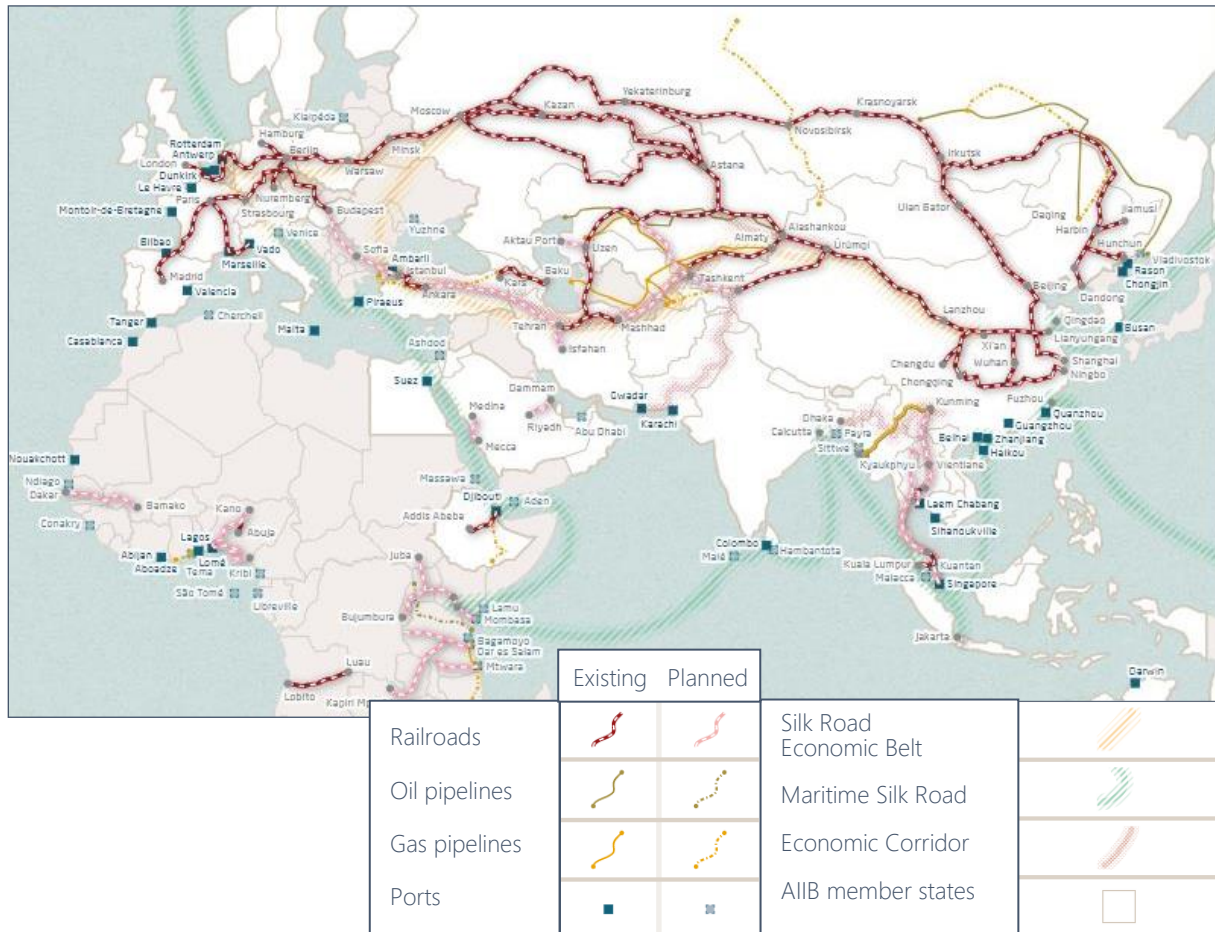
The lesson is that, a thing (e.g.: idea, technology, product) can be invented, bought or stolen and it all depends on the situation. Going back 900 years, China was the cradle of every important inventions, giant ships divided by compartments and equipped with compasses, printed paper, porcelain, and gunpowder and the Europeans stole what they could. Then, about 600 years ago, the Chinese emperor, listening to his bureaucrats and guild masters, ordered a stop to the building and operating of the fleet and even destroyed most of the ships, to calm the upset people. The new laws also banned inventions, so the technological development of China slowed down considerably. Half a millennium has passed since and at present China is at the forefront of economic development, using market and non-market conform methods to help the giant country to rise and thus the world economy to grow. It is very much hoped that all the benefits of digitalization will be used efficiently, facilitating the diffusion of information that will stimulate large-scale innovation. In this case, the engine of the new type of foreign trade will spin around the exchange of ideas and not around the socks or the handsets, because they will be produced domestically by robots.



## 7. Investment and Foreign Trade of China with CEE, CEE Growth and Robotization

Let's start with a map about BRI planned routes from.

Figure 12:  
BRI planned routes



Source: *merics.org., n.d.*

China's new Silk Road on the Eurasian continent leads through the Shanghai-Moscow-Berlin and Shanghai-Tehran-Budapest-Berlin railway lines and the Shanghai- Kenya-Suez-Venice sea route reaching almost all EU countries. CEE (in the 17+1 Initiative) is an EU bridgehead, but Moscow may be given the key role in Eastern Europe as the main route in that region heads from Istanbul up to Moscow and to Berlin. According to a Citi analytical study, Chinese import to the CEE-17 region as a share of GDP are between 2% and 6% respectively and exports between 0% and 1.5%. China's 2016 FDI stock/GDP ratio is between 0-2 % in the CEE region. Within the small numbers, the Hungarian share is high. According to W. Mitchell's theory, CEE countries are mostly border guard countries in the enclosure policy and therefore their activities are strategically important. On the other hand, CEE region is subject to many pressures:

- a) Strong foreign trade and technology transfer (robotics) relations with Germany;
- b) US weapons systems on the Russian border;
- c) Energy dependency from Russia;
- d) 17+1 status in BRI and EU in relations to China.

The northern part of the CEE region has typically become more developed, although there is a rapid catch-up in the south (Romania). Inherited (and new) debt from the socialist era explains much of the 30-year dynamics of each country.

CEE countries geopolitically cannot easily stand firm in this quadruple challenge (German economy and robotics, US defense policy, energy dependence from Russia and transit role in China's BRI project). Although the CEE countries are used as "ferry boat countries", because of their centuries-old experience. On the other hand, it is also true that the countries of CEE region did not adapt well to the quadruple challenge.

Table 8:

CEE countries' development relative to German development between 2000-2018

	Slovenia	Czech	Estonia	Slovakia	Hungary	Lithuania	Poland	Croatia	Latvia	Romania	Bulgaria
2000	60%	56%	41%	41%	48%	32%	39%	42%	30%	27%	25%
2001	61%	57%	43%	42%	49%	34%	39%	43%	32%	28%	26%
2002	63%	58%	46%	44%	51%	37%	39%	45%	34%	30%	28%
2003	65%	60%	50%	47%	54%	41%	41%	48%	38%	32%	30%
2004	68%	63%	53%	49%	56%	44%	43%	48%	41%	34%	32%
2005	70%	66%	57%	51%	58%	48%	44%	50%	45%	36%	34%
2006	70%	68%	61%	54%	58%	50%	45%	50%	49%	37%	35%
2007	72%	69%	64%	57%	56%	54%	46%	51%	53%	39%	36%
2008	74%	69%	60%	60%	56%	56%	48%	51%	51%	43%	38%
2009	71%	69%	54%	60%	56%	51%	52%	50%	46%	43%	39%
2010	69%	67%	53%	60%	54%	50%	52%	48%	44%	40%	38%
2011	67%	66%	55%	60%	53%	53%	52%	47%	46%	40%	39%
2012	64%	65%	58%	60%	52%	55%	53%	46%	48%	40%	39%
2013	63%	64%	59%	61%	53%	57%	53%	46%	50%	42%	39%
2014	64%	65%	60%	61%	55%	59%	54%	45%	50%	43%	39%
2015	65%	68%	60%	63%	56%	60%	56%	46%	52%	44%	41%
2016	66%	69%	62%	64%	57%	62%	57%	48%	53%	46%	42%
2017	68%	70%	63%	65%	58%	64%	59%	49%	54%	49%	43%
2018	70%	71%	65%	67%	61%	66%	61%	50%	57%	50%	44%

Source: own compilation based on Central Statistical Office, Hungary

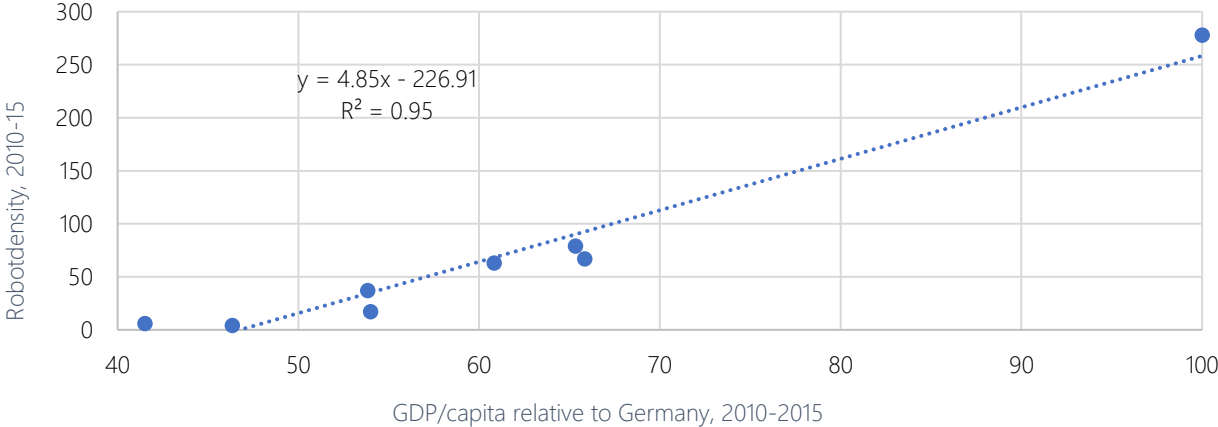
Table 9:

GDP per capita and Robot Density of Germany and the CEE Countries 2010-2015

	<i>pcGDP 2010-15</i>	<i>Robot-density</i>	<i>Robot-density</i>
Slovenia	65.3	79	
Czech Rp	65.8	67	
Estonia	57.5		5
Slovakia	60.8	63	
Hungary	53.8	37	
Lithuania	55.7		n.a.
Poland	54	17	
Croatia	46.3	4	
Latvia	48.3		n.a.
Romania	41.5	6	
Bulgaria	38.7		
Germany	100	278	

Source: IFR World Robotics, 2017; Central Statistical Office Hungary

Figure 13:  
 GDP per capita and Robot Density, Germany and the CEE Countries 2010-15



Source: IFR World Robotics, 2017; Central Statistical Office Hungary

The different challenges – indirect labor export to Germany, direct energy import from Russia, the US leads NATO’s deployment zone, and the 17+China as the EU’s GATE – from country to country and from time to time results in complex situations that may not be very well answered. Let’s look at how countries in the region have approached German development over the past two decades.

8. Conclusions

In a world, which has formerly rapidly globalized, the increase of export to GDP ratio has paused and countries tend to shift to a new technological path as digitalization and robotization is becoming cheaper and cheaper.

During the rest of the 21<sup>st</sup> century, the export of goods is expected to be replaced by the idea trade, and cheap (compared to wages) robots will be working at homeland.

Poverty is on his way to vanishing in an increasing part of the world and parallel to that TFR will fall under 2.1 by 2100. New power centers and alliances are likely to emerge.

The structure of the society of the East-Asian developmental states (strong state/weak society) makes those countries capable of adopting robotization and a serious question arises. When will strong state/strong society-like countries take the pace?

Overall, China has been at the forefront of technological advancement for many centuries, but we do not know whether it will return to its leading position, will it become Chin-AI. It has shifted as a developmental state, its export/GDP ratio is likely to remain in the longer term below its peak of 2010. China may shift from being an export-oriented developmental state to being a robot-based developmental state.

From a geopolitical standpoint, BRI may be interpreted as a means for China to achieve the leading role and some may express concerns about this. Others say that by the age of robotization the growth rate of export to GDP ratio will decline and international trade and e-commerce will mainly consist of exchanging ideas. Over the last decades digitalization has reshaped education also, the younger generation operates very differently from older generations.

Let’s look at again the competition between Chin-AI and EU-US in 2050, so far, the two sides have an even and open field of play. CEE countries navigate under the four challenges’ pressure (German robotization, Russian gas, US weapon system and China+17).

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