Developing economic cooperation in modern conditions. The case of Ukraine and China

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Abstract

Ukraine and People's Republic of China (PRC) are cooperating in some areas like: machinery, transportation etc. China is interested in partnering with Ukraine for selling Chinese consumer goods. Ukraine is interested in selling raw materials to China. To study this possible cross-border cooperation and commercial relationship, the current paper uses the "intensity of interaction" (namely, the depth of integration) model, which is based upon the existing "gravity model". The index for existing model has been obtained by adding a "dummy variable" in the standard "gravity model" which reflects the influence of regional nuances upon the level and direction of trade flow. The strategic partner relationship must be based on: "complementing" the economic structure of the partners, which means equality in the relationship and lack of significant disparities.

Keywords: the gravity model, strategic partnership, scientific-technical cooperation, Ukraine - China relationship
JEL Classification: F5, F6

Introduction

From an economic point of view, People's Republic of China (PRC) is an economic powerful country and is a very promising prospective business partner for Ukraine. A lot of Ukrainian goods and services could possibly find a place in the massive global Chinese markets. Because of polarization, countries which cannot qualify as participants in large international trade relations need to develop bi-lateral trade relations with likeminded countries, such as: Ukraine and PRC. Ukraine and PRC are already cooperating in some areas like: machinery, transportation etc. China is interested in partnering with Ukraine for selling Chinese consumer goods. Ukraine is interested in selling raw materials to China. Ukraine does not think such a relationship is sustainable over the long haul. To study this possible cross-border cooperation and commercial relationship, we have used the "intensity of interaction" (namely, the depth of integration) model, which is based upon the existing "gravity

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model". The index has been obtained by adding a "dummy variable" in the standard "gravity model" which reflects the influence of regional nuances upon the level and direction of trade flow. The strategic partner relationship must be based on: "complementing" the economic structure of the partners, which means equality in the relationship and lack of significant disparity maintaining, at the same time, the life style of the people and society. Development of economic cooperation amongst countries is also an important aspect. Moreover, in the analysis there were taken into account additional important aspects, such as energy, food, strategic raw materials, natural resources, access to the vital places of the world, national security, etc.

Amongst the researchers who had developed methical approaches to international cooperation and implementation of trade and economic activities, there are noteworthy works of Ukrainian scientists. Some researchers, who analysed the Ukrainian - Chinese relations, pointed out the need to increase Chinese investments in Ukrainian economy. The important question of determining the road blocks and obstacles to be faced by Chinese investors was not touched, nor was the possible benefit to be accrued by Ukraine economy clearly defined. Despite the profound and good work completed by above researchers, much work still remains to be completed.

The aim of the article is to use the "gravity model" by adding a "dummy variable" so that it reflects the influence of regional aspects on the level and direction of trade flow. Another aim is to study the possibility of cooperation between Ukraine and China bearing in mind their differences and their economic structures. The last aim is to evaluate the possible cooperation at the scientific and technical level. The task of the article is thus to analyse the present situation of the relationship between two countries and their current economic capabilities. The study also aims to present recommendations to intensify the scientific and technical cooperation between the two countries.

1. Developing economic cooperation

Globalization and innovative changes in financial and trade make it impossible for any country to stay insulated from rapid and sometimes radical changes in the world economy. Today's world economic trends which suggest openness to any country's market and economy, spurs competition creates a core of powerful, rich and stable countries as leaders and the weaker, less progressive ones on the periphery as followers. Thus, in many countries the government's role in managing their economies' declines. These countries are forced to react and find new and innovative ways to combat this trend and to find new ways to manage their national, economic, political and legal environments, policies, rules and regulations. A successful example is China. They have designed and executed their

proprietary innovative system which extracts, copies, imports or poaches upon global experience and technology in innovation and rapidly applies it to its national economic system. Thus PRC benefits not only nationally but also transnationally. According to the information obtained from The World Bank (1991- 2015) one can see how rapidly PRC's GDP per capita increased since the Independence of Ukraine in 1991. The growth rate of GDP and GDP per capita was slow from 1991 to 2005. But in the next 10 years: 2005-2015, GDP per capita increased more than 3.8 times or 283%.

Clearly the important method of accomplishing scientific and technical cooperation amongst all countries in the world is: import technologies and export technologies. Via the import technologies, China increases its technological and industrial efficiencies very rapidly thus decreasing the overall growth timeline. Per statistical information (Eurostat, 2014, 2015), in 2014 China's import technologies were USD 830.6 million which was 35.9 % of entire worlds import technologies. Already in 2015, China's technical imports stood at USD 783.7 million, which is 46.6% of the entire worlds import technologies. China's major import technologies were in areas like patent acquisition technique, technical consultation, technical services and technical equipment purchases. China concentrated heavily on import technologies in industries like electronics, electric power generation and distribution, steam, hot water, chemicals and chemical food production (Eurostat, 2014, 2015). Presently, China's import technologies are mainly from Japan, USA, EU and ASEAN countries.

China started to be attractive for other developed countries with superior technologies but high labour costs to conduct business in the accessible and cheap labour market of China. China was able to obtain superior technologies at an unprecedented scale. This led to construction and start-up of many research centres. With the presence of so many foreign investors on the mainland, it was possible to promote multi-lateral exchange of technologies amongst them. China's auto industry signed joint agreements with foreign auto companies. Similar joint agreements in other industries lead to China becoming a world leader in manufacturing inexpensive consumer products. This allowed Chinese auto companies to adapt best production practices and techniques and emerge as a leader on the world stage. The other interesting aspect was that Chinese companies became stock holders in foreign companies and began to get a part of profit dividends from stock capital investments of these companies in other foreign markets. This further opened the way for China to obtain more sophisticated technologies from some of the famous leading technological companies of the world (Bugayova, 2010). Firstly, it should be noted that a collaboration on the basis of bringing in licensed technologies is also a strategic right step: firstly, there is a cooperation with foreign companies (during the process of signing and obtaining the license agreements). Secondly, the licenses help indigenous manufactures to apply these sophisticated licenses to innovate proprietary technologies. The

establishment of joint research centres also helps to permanently increase and improve the scientific talent base as well as the skills of scientists, researchers and technologists.

In 2012 (Table 1), PRC invested USD 143 million or 1.7% of their GDP on Research and Development (R&D), thus putting PRC at 21st place in the world. In the same year, Ukraine spent USD 1.51 million or 0.86% of their GDP on R&D. This got Ukraine 36th place in the world (Eurostat, and World Bank, 1996-2015).

Table 1. PRC investment in China on R&D (millions US dollars)

Years	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Expenses	300.31	371.02	461.6	580.21	706.26	868.7	1029.8	1184.7	1301.6	1425.2

Source: Eurostat and World Bank, 2006-2015

Table 1 shows that during the period from 2006 to 2015, China's R&D investment took a steady growth of 15-20% per annum. During this period, goods for developed countries were produced under the license agreements but for the "third world" goods were produced under license agreements as well as copies of pre-production models.

There is definite potential for Ukraine to act as a gateway or entry point or so called "Silky Way". Ukraine can act as a landing point or transit camp or port of entry for Chinese goods bound for Europe and EU countries. Plans were in place to build in Crimea a deep water port to allow large merchant ships to dock and to construct warehouses to store goods. Annexation of Crimea by Russia has nixed these plans. Now plans will need to be made to provide these facilities on mainland Ukraine.

Big amount of scientific projects and developments will bring a "desire" to sell a commodity which could be done by the new technologies, around the world`s markets. As China does not have a strong customs tariffs with many countries, it pushes to the searches of optimal variants for the realization of such program.

On the June 27th, 2014 Ukraine signed a trade agreement with an executive body of the EU. This agreement allows domestic Ukrainian goods and consumer products to be sold in Europe and vice versa. This agreement encourages and motivates domestic Ukrainian manufacturing industries to improve their technologies to match the superior European technologies. Superior domestic products will hopefully in the long run, increase exports to Europe. There is significant human scientific and technical talent in Ukraine. This agreement also promotes exchange of technical and scientific knowledge which in turn promotes innovation in Ukraine. Ukraine has some world renowned universities with excellent teaching and research facilities. This agreement also allows universities, especially higher education universities to establish relationships with EU universities

to further promote R&D and innovation. Consequently this acquired new knowledge and ideas can help domestic higher education institutions to interact with local industries and manufacturing establishments to make their operations more technically savvy, sophisticated and efficient. One way to spread the innovation is to create regional clusters in Ukraine. Once this activity starts, innovation can spread rapidly by Domino effect to every region of Ukraine and lift the quality and speed of production of goods and services in Ukraine.

Now the question is: how does one predict what happens in every bilateral agreement? Can we apply the "gravitational model' as is or not? Because every region in Ukraine is unique and every industry in every region is unique too, there is a need to tweak the "gravitational model". Therefore to predict scientific and technical collaboration between any two entities engaged in bi-lateral activity, there is a need to add a dummy variable into existing "gravitational model" and give the name an index "intensity of cooperation". This dummy variable will account for an array of regional and local variances and once it is properly determined, will make the "gravitational model" very accurate.

The standard gravitational model (formula 1) which predicts the volume of trade between two countries, has three variables; GDP of each country and the distance between the two countries. The transportation and tariff costs are affected by the distance between the two countries, therefore distance is the third variable in the gravitational model (Moskovkin *et al.*, 2007).

$$\text{Iua/ch} = \frac{GDP_1 \times GDP_2}{r^2},$$

(1)

$I_{ua/ch}$ - the index "intensity of cooperation" between two countries, (thousands of conventional money signs in a square kilometres);

GDP_1 and GDP_2 - the gross domestic product, adjusted economy of a country, thousands of conventional money signs;

r – the distance between countries, km.

Table 2 displays the statistical data about the foreign economic activity between the two countries from 2013 up to 2015 (The Ministry of finance of Ukraine and World Bank, 2013-2015).

Table 2. The basic indexes are for settling the "gravitational model"

№	Indexes	Ukraine			China		
		2013	2014	2015	2013	2014	2015
1	Density of population (persons per km^2)	75.2	75.2	75.2	141.3	141.7	142
2	Density of transport networks (thousands of km per km^2)	0.4	0.4	0.4	0.38	0.38	0.4
3	Area (territory) of country (km^2)			603550			9598 089
4	Population (millions of persons)	45.4	45.4	42.9	1357	1360.7	1367.8
5	Export to GDP (%)	43.42	49.15	52.7	24.6	23.9	22.3
6	Incoming investment (millions of US dollars)	4500	847	3050	290000	268000	249000
	Exports of services (billions of US dollars)	22.61	14.88	12.36	207	280.4	286,54
7	Exports of commodities (billions of US dollars)	59.1	50.55	35.42	2149	2 224	2143
	Exports of high-tech products (billions of US dollars)	2.19	1.9	1.6	560.1	558.6	555,6
8	Working population (millions of persons)	18.9	17.1	15.7	930.9	925.3	926.1
9	Commodity turnover of the country (billions of US dollars)	174.25	134.9	96.77	4473	4667	4476
10	GDP per capita (thousands of US dollars)	3986	3065	2114	6991	7587	7924

Source: The Ministry of finance of Ukraine and World Bank, 2013-2015

The authors define (see the formula no 1) the index "intensity of cooperation" ($I_{ua/ch}$) as the conditional distance between the capitals of two countries i.e. 6.457 kilometres. The next results (see table no 3).

Table 3. The index "intensity of cooperation" between Ukraine and China using the standard "gravitational model" (2013-2015, thousands of conventional money signs per km^2)

Years	2013	2014	2015
$I_{ua/ch}$	0.00610509	0.00558696	0.00518967

Source: Authors' calculations

From the data (see table no 3), we note decline in the intensity of cooperation between two countries; from 8.5 % in 2014 to 7.1% in 2015, both compared to their previous years respectively. Though the distance between the two countries remained the same, Ukraine's GDP reduced, therefore the index "intensity of cooperation" changed.

Although the bi-lateral trade potential between the two countries is high, possibility of conducting trade goes down, as the distance between the countries increases. This is due to taxes and tariffs imposed by both countries as well as other different countries en-route as the goods travel via sea lanes through them. Also higher transportation costs are incurred over longer distances. All these costs are billable to the exporting country. To account for the tariffs, taxes and transportation costs, it is necessary to insert a variable K into the standard "gravitational model" (see formula no 2).

$$\text{Iua/ch} = k \cdot \frac{GDP_1 \times GDP_2}{r^2},$$

(2)

K - a dummy variable that characterizes intensity of particular area of Ukraine where imports from China are received.

Let us adjust (formula no 2) to reflect the "infrastructure" capabilities or resources of different regions of Ukraine (see table no 4).

Table 4. Index "intensity of cooperation" between some areas of Ukraine and China adjusted to the feature "infrastructure", in 2013-2015

Areas of Ukraine	Amount of import`s services by years, (thousands of USA dollars)			A dummy variable "K", (by years)			Index "intensity of cooperation" ($I_{ua/ch}$), (by years)		
	2013	2014	2015	2013	2014	2015	2013	2014	2015
Republic of Crimea	3132709.7	-	-	0.0123	-	-	0.000069	-	-
Vinnytsya	621249.4	15120.9	11840.2	0.0054	0.0032	0.0030	0.000033	0.00002	0.00002
Volyn	504068.6	20480.5	16702.7	0.0069	0.0044	0.0043	0.000042	0.00002	0.00002
Dnipro	309420.5	370389.1	402092.8	0.0818	0.0789	0.1030	0.000499	0.00044	0.00053
Donetsk	268632.3	352362.2	199811.5	0.1008	0.0750	0.0512	0.000615	0.00042	0.00027
Zhytomyr	191581.3	14091	9189.4	0.0025	0.0030	0.0024	0.000015	0.00002	0.00001
Zakarpattia	181439	33156.9	20857.2	0.0079	0.0071	0.0053	0.000048	0.00004	0.00003
Zaporizhzhya	167387	75529.6	66689	0.0168	0.0161	0.0171	0.000102	0.00009	0.00009
Ivano-Frankivsk	113178	22757.7	13221.7	0.0056	0.0048	0.0034	0.000034	0.00003	0.00002
Kyiv and Kyiv region	103378.7	2780976	2409849	0.5586	0.5923	0.6172	0.003410	0.00331	0.00320
Kirovohrad	78194	32669.8	22615.2	0.0078	0.0070	0.0058	0.000048	0.00004	0.00003
Luhansk	77872.5	141198.1	96837.3	0.0272	0.0301	0.0248	0.000166	0.00017	0.00013
Lviv	75919.1	83382.4	50226.9	0.0184	0.0178	0.0129	0.000112	0.00010	0.00007
Mykolaiv	48413	53212.1	51416.2	0.0127	0.0113	0.0132	0.000077	0.00006	0.00007
Odesa	48311.7	217467.3	132453.8	0.0436	0.0463	0.0339	0.000266	0.00026	0.00018
Poltava	42374.2	194887.1	151916.8	0.0311	0.0415	0.0389	0.000190	0.00023	0.00020
Rivne	34378.9	23125.8	15091.4	0.0045	0.0049	0.0039	0.000028	0.00003	0.00002
Sumy	33167.3	48929.8	66542.8	0.0126	0.0104	0.0170	0.000077	0.00006	0.00009
Ternopil	30397.5	8467.8	10392.7	0.0021	0.0018	0.0027	0.000013	0.00001	0.00001
Kharkiv	27916.4	128314.1	103556.6	0.0294	0.0273	0.0265	0.000180	0.00015	0.00014
Kherson	20453.1	4759.7	8080.5	0.0008	0.0010	0.0021	0.000005	0.00001	0.00001
Khmelnytsk	16556.8	11043.8	10198.6	0.0027	0.0024	0.0026	0.000016	0.00001	0.00001
Tcherkasy	15274.7	32724.8	18675.6	0.0033	0.0070	0.0048	0.000020	0.00004	0.00002
Chernivtsi	12633.6	1441.8	1820.2	0.0004	0.0003	0.0005	0.000002	0.00000	0.00000
Chernihiv	10028	28928	14341.3	0.0049	0.0062	0.0037	0.000030	0.00003	0.00002

Notes: Because of the annexation Republic of Crimea there is no data after 2013.
Source: Authors' calculations

Analysing the database (see table no 4), it is fair to conclude that different regions of Ukraine have different appeal to investors. This includes influences like: quality of roads and highways, availability of nearest port(s), availability of scientific and technical resources, specialty of the region etc. Kherson is attractive for agriculture and related industry. Dnipro area is a space rocket manufacturing area with a lot of scientific and technical activity. Kharkiv area is known for Engineering, Architecture and instrument manufacturing.

Some scientists like: (Anderson *et al.,* 2003) suggested to include a "variable index' into the existing "gravitational model". The argument was that "artificial" obstacles such as trade organizations or union activity could prevent countries from entering into a trade agreement. In this case, China and Ukraine are already members of the World Trade Organization (WTO).

2. Findings and recommendations

Overall, considering the analysis conducted above, we conclude that the "gravitational model" needs review and revision, also the "gravitational model" had some inaccuracies which are listed below:

1. Distance between the countries was measured as a straight line between the capitals. In fact the two parties could be in opposite corners of the countries or for that matter anywhere else in the country. Consideration of physical barriers like rivers, mountains, rail road lines, highways and roads was also ignored. Therefore (see formula no 1) can only be used if the exact route and physical distance between two points is defined and known.

2. The calculations of GDP (it`s when information taken from the public statistics) can be conducted by the national currency exchange rate, but the index of PPP exchange rate of each separate country will be ignored, this fact can make an influence on the result of general research.

3. Mathematical interpretation of "gravitational model" does not take into account the effect of illegal trade activity. This is very difficult to measure. A "legal import" has a big matter at the programs which stimulated an industries of economy and methods of fight against the illegal import of commodities at the own (indoor) market. A legal import at the local market, strengthen a competition between the commodities` producers and thus becomes the main factor of increasing the competitiveness of the Ukrainian producers. Obviously, with the advent of the "shadow" products at the local market, which unladen by taxes and duty, threatens to existence of many enterprises and whole economy.

In order to promote vigorous trade between China and Ukraine, Ukraine has to drastically reform its trade practices and revise relevant rules, regulations and tax codes. Some specifics are listed below:

1. Revise defence of owner's property rights in Ukraine. Revise legal system such that disputes can be settled quickly. Provide equal rights to exporter(s) and importer(s) in a court of law. Current laws are biased against a foreign enterprise or entity. Current laws that allows predatory takeover of foreign investment like property, factory etc., should be abolished.

2. Evaluate and improve investment climate. The permanent monitoring and broadcasting of macroeconomic indices must throw light on problems and issues in different segments of the economy. Reports must be accurate and truthful.

3. Significantly lower business, property and investment federal, state and local taxes. Besides lowering taxes there should be constant review of tax rate and tax codes to reflect the state of business

climate. In 2015 the average tax rate on commercial income in China was 67.8% and in Ukraine it was 52.2 %. As evident, difference in rates between two countries was not very large. At the same time note the much lower tax rates in UAE the rate at 15.9% and in UK at 32% (Bussiere *et al.*, 2015).

4. Government and its ministries of trade to ensure a stable and thriving economy. Provide dynamism and pro-activism in the crisis management procedures and agencies. Review national economy and risks from world markets regularly.

In the long run it is difficult to guarantee stable and steady development of an economy through insufficient internal demand, weak economic bases, irrational structure of export, imperfect banking system. The Ukrainian market at this time is immature and there are profound risks for investments and collaboration activities. Ukraine is rich in natural resources, has a strong industrial base and has a very large scientific and technically savvy work force. Political shocks, absence of long and short term economy plans are averse to foreign investments. Audits, evaluations and ratings of financial institutions both government and private must be performed by international organizations.

Conclusions

China owns a large industrial base, sound economy, large investments and scientific talent. In Ukraine the amount of foreign investments is insignificant, industrial base is weak and technology is backwards. Also Chinese investors need to adhere to the unfavourable, Ukrainian laws, investigate investment risks by factoring in a lot of risk contingencies. Also there are language and cultural barriers plus the geographical remoteness between the two countries. The considerable geographical remoteness included in the "gravitational model" is inversely proportional to the distance between them and proportional to the commodity turnover. The silver lining is that both countries participate in WTO, an organization that minimizes tariff barriers, assists, adjusts trade relations and prevents discriminatory practices. Therefore the main objective of the Ukraine and China collaboration should be to create the most attractive terms of collaboration. This should include lower property taxes and import tariffs, fair defence of investor interests, stability in financial institutions, low interest rates and readily available commercial loans and creation of joint ventures for the production of goods and services.

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