HOW CORONAVIRUS DESEASE (COVID-19) INFLUENCE CHINA ECONOMY SUSTAINABILITY

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What we know

The world is experiencing social decline and economic turmoil. Humanity is experiencing environmental degradation, viruses' attacks and an uncontrollable decline in GDP(Ward *et al.*, 2016). Nowadays, essential not only to maximize profits, but to maintain economic stability, protect the Planet(Li *et al.*, 2018). The most essential is to find a way to the sustainable society and overwhelm post-epidemic crises(Cao, 2019).

Since the opening and reform in 1978, China has made remarkable progress in economic development(Yan *et al.*, 2020). After the financial crisis in 2008, the global economy faced a downward trend, but China's economic development entered a maintaining medium-low growth rate. China's economic growth is highly resilient, providing ample room to meet external challenges to achieve high-quality development. The China Central Government has put forward the country's sustainable development plan and that it is not only quantitative growth, but also qualitative improvement (Hui, 2018)(Pan *et al.*, 2019)(Yan *et al.*, 2020).

Research tasks

1. **Analyze how the virus can influence on the China migration and financial flows between provinces.**
2. **Define how the virus influence the China provinces' sustainable indicators.**
3. **Suppose four scenarios of the China industries' production and supply transportation channels after the coronavirus outbreak;**
4. **Apply this approach to identify China provinces' economic imbalance and prevent the most unsatisfactory situation.**
5. **Analyze after-coronavirus financial flows between China and Russia.**

Methodology:
Input-output efficiency analysis

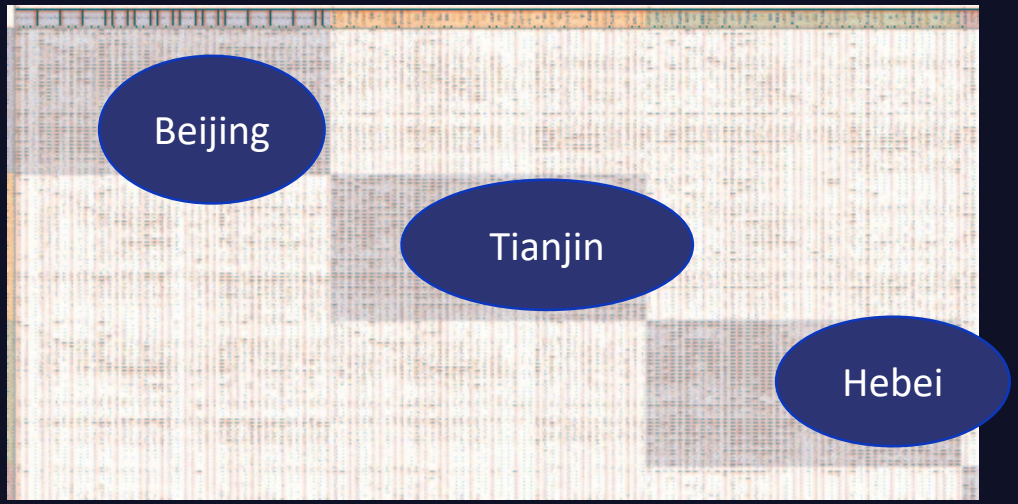
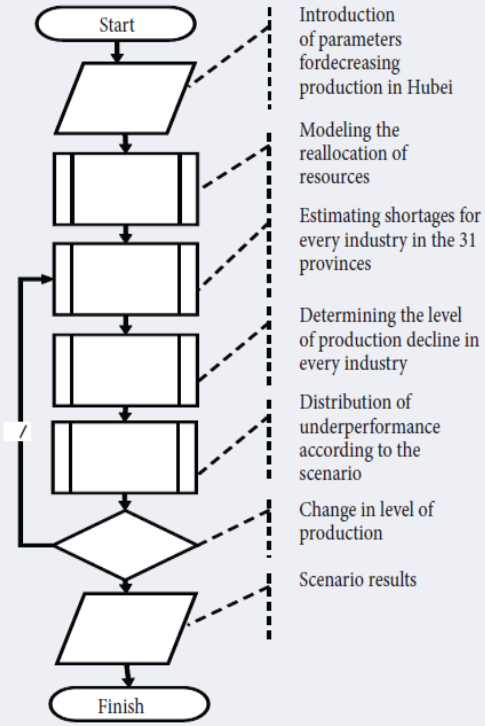


Fig 1 **China regional Input-Output sheets sample**

Methodology:
Decision Making Sheme



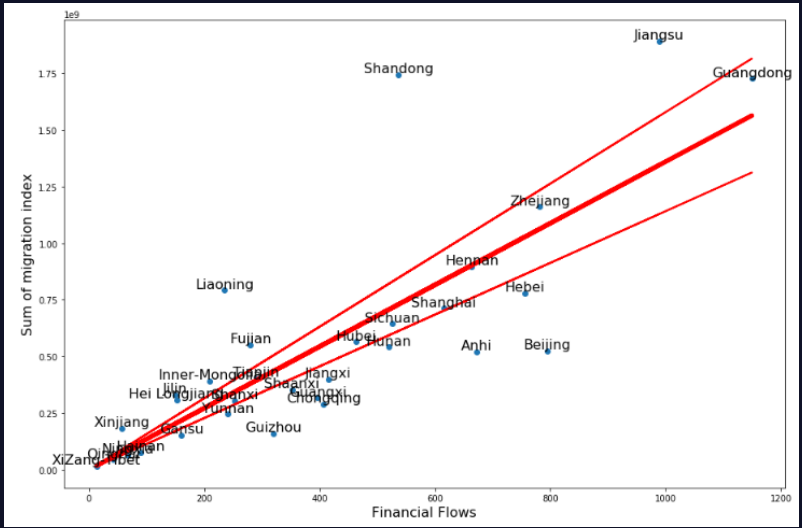
Source: Authors methodology.

Regression modeling results

Dep. Variable:	FinansialFlow	R^2:	0.850
Model:	OLS	Adj. R^2:	0.845
Method:	Least Squares	F-statistic:	104.7
Date:	Sun, 12 Apr 2020	Prob (F-statistic):	2.68e-11
Time:	06:45:49	Log-Likelihood:	-647.35
No. Observations:	31	AIC:	1297.
Df Residuals:	30	BIC:	1298.
Df Model:	1		
Covariance Type:	HC1		

	coef	std err	z	P>|z|	[0.025	0.975]
MigrationIndex	1.36e+06	1.33e+05	10.231	0.000	1.1e+06	1.62e+06

Omnibus:	18.892	Durbin-Watson:	2.013
Prob(Omnibus):	0.000	Jarque-Bera (JB):	28.197
Skew:	1.443	Prob(JB):	7.53e-07
Kurtosis:	6.674	Cond. No.	1.00



Financial flows between provinces

SARIMA model results

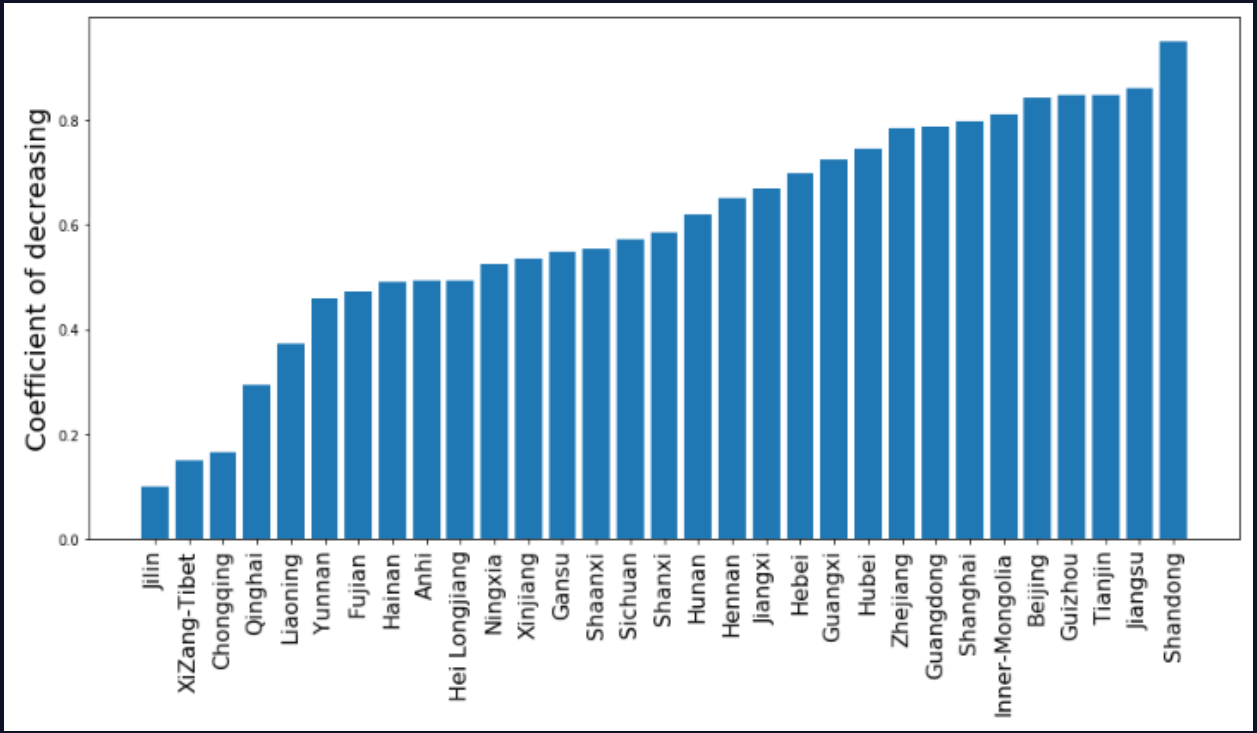
Dep. Variable:	Proc_D	R-squared:	0.770
Model:	OLS	Adj. R-squared:	0.744
Method:	Least Squares	F-statistic:	25.17
Date:	Tue, 17 Mar 2020	Prob (F-statistic):	5.58e-08
Time:	01:38:57	Log-Likelihood:	87.049
No. Observations:	31	AIC:	-166.1
Df Residuals:	27	BIC:	-160.4
Df Model:	3		
Covariance Type:	HC1		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	0.0138	0.003	4.924	0.000	0.008	0.019
CO2_P	0.0039	0.002	2.166	0.030	0.000	0.008
HW	0.0277	0.003	8.546	0.000	0.021	0.034
ERE_GDP	0.0072	0.003	2.691	0.007	0.002	0.012

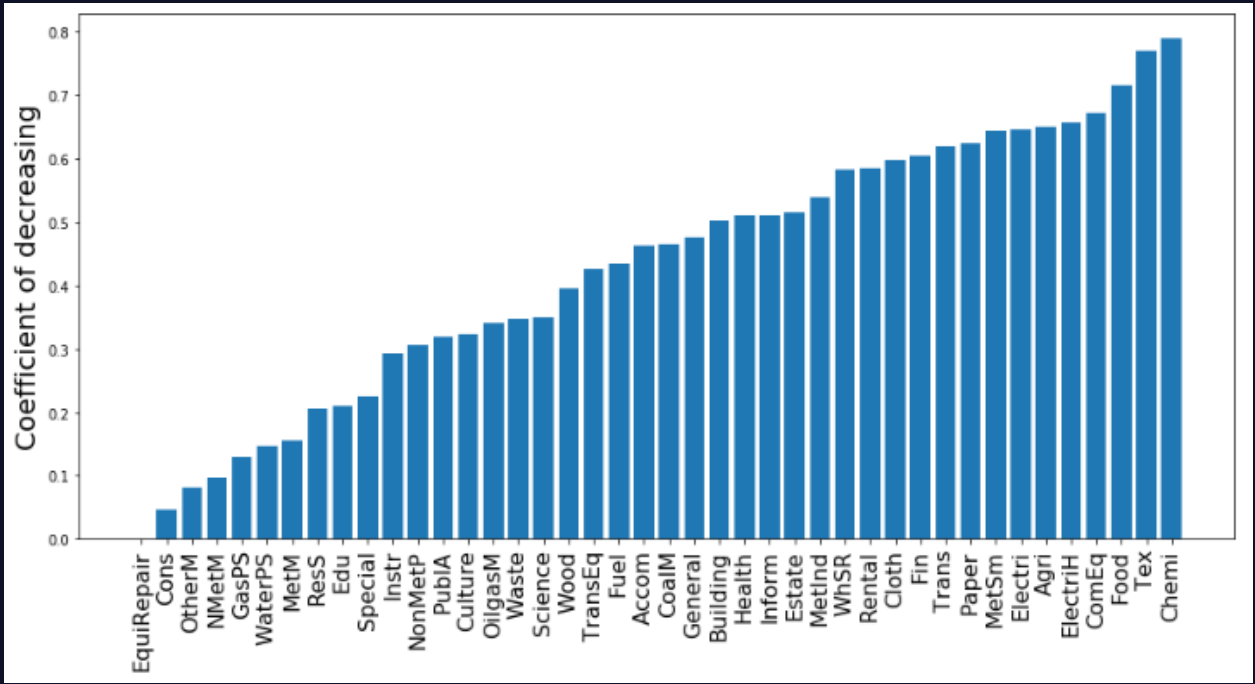
Omnibus:	7.226	Durbin-Watson:	1.952
Prob(Omnibus):	0.027	Jarque-Bera (JB):	6.013
Skew:	0.724	Prob(JB):	0.0495
Kurtosis:	4.599	Cond. No.	1.38

m1 = smf.ols('Proc_D ~ CO2_P + HW + ERE_GDP',data=dfg1)

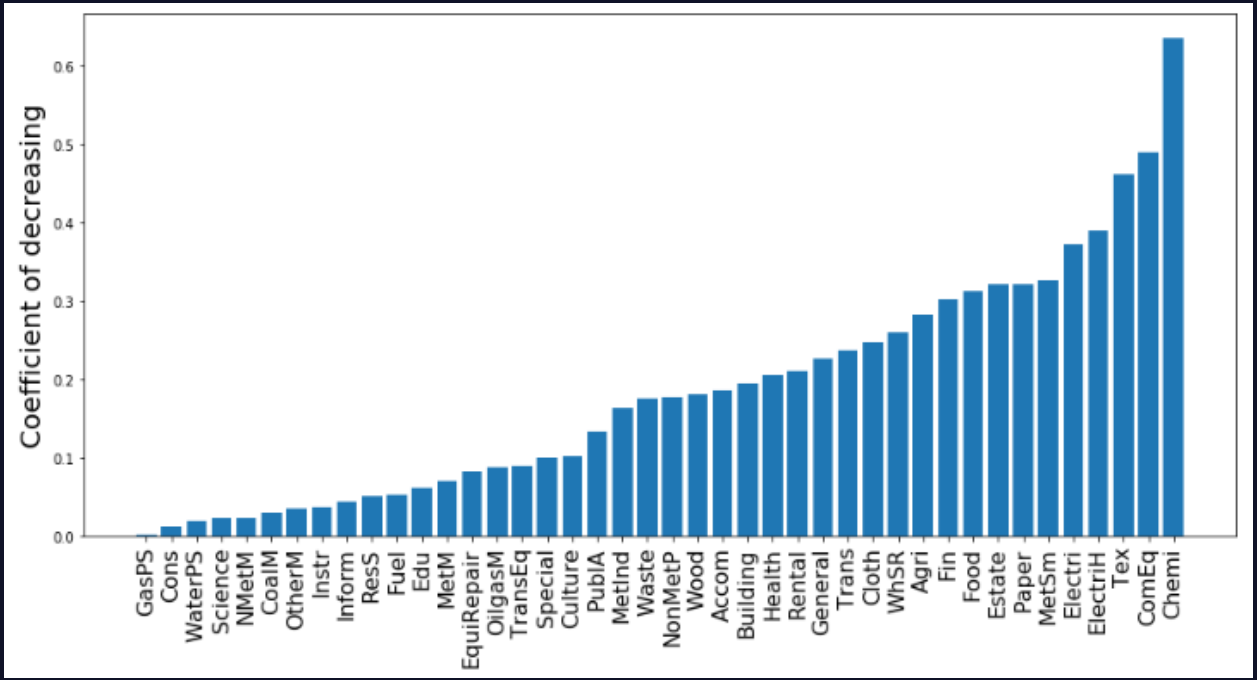
Simulation results of provinces production drop in case of Hubei province three –month after-coronavirus crises (Scenario I)



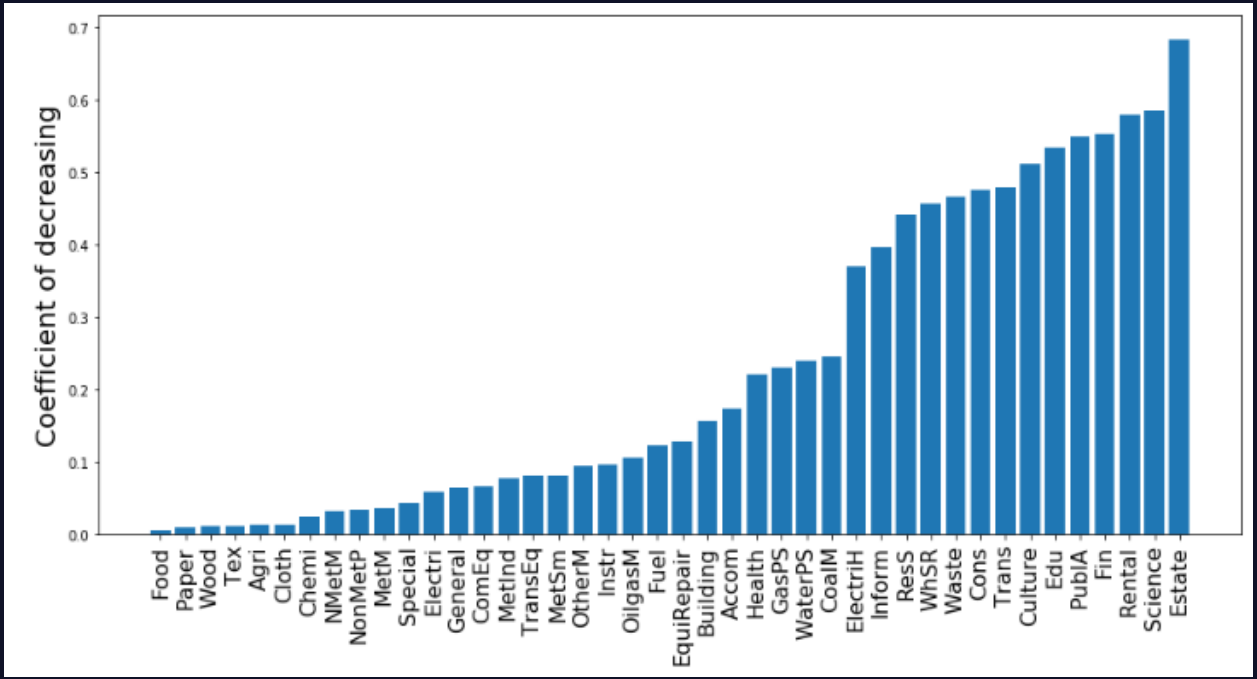
Simulation results of provinces production drop in case of Hubei province three –month after-coronavirus crises (Scenario II)



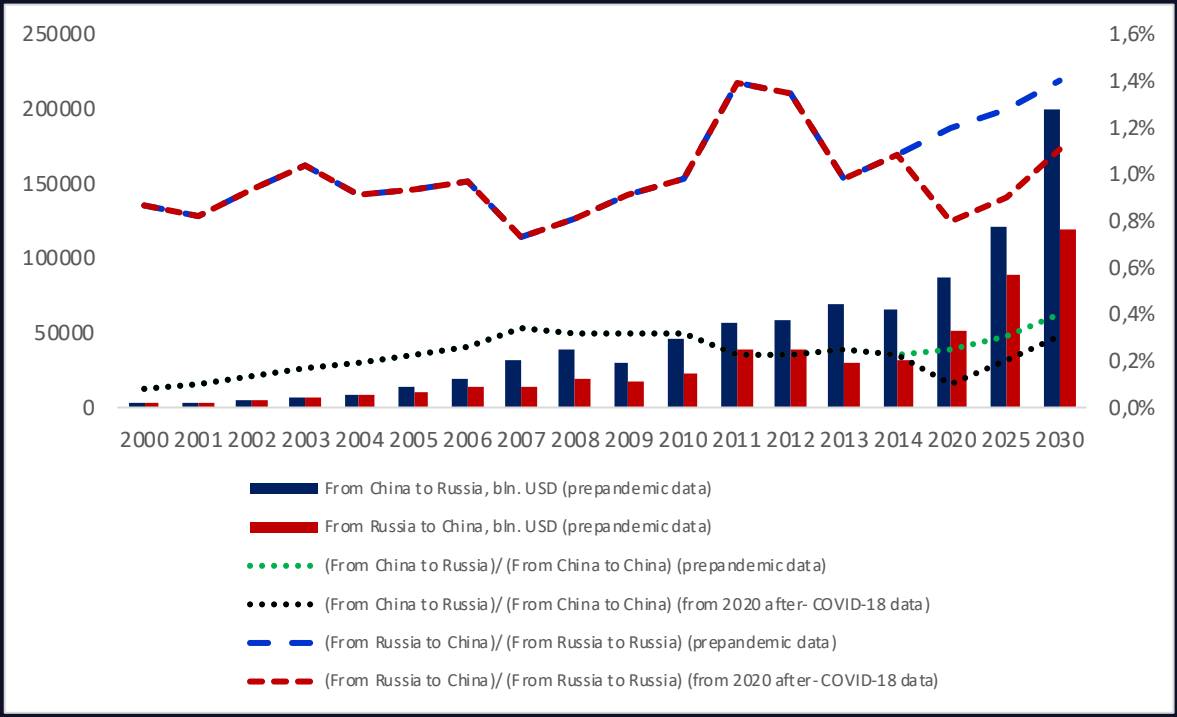
Simulation results of industries production drop in case of Hubei province three –month after-coronavirus crises (Scenario III)



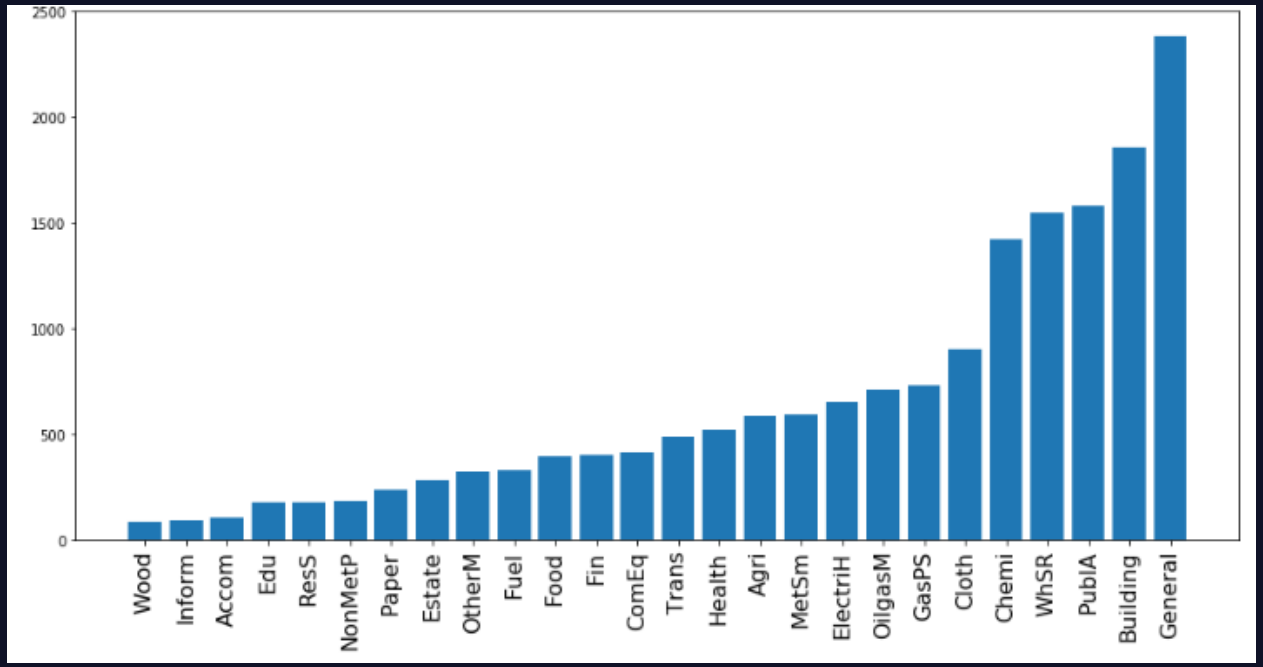
Simulation results of industries production drop in case of Hubei province three –month after-coronavirus crises (Scenario IV)



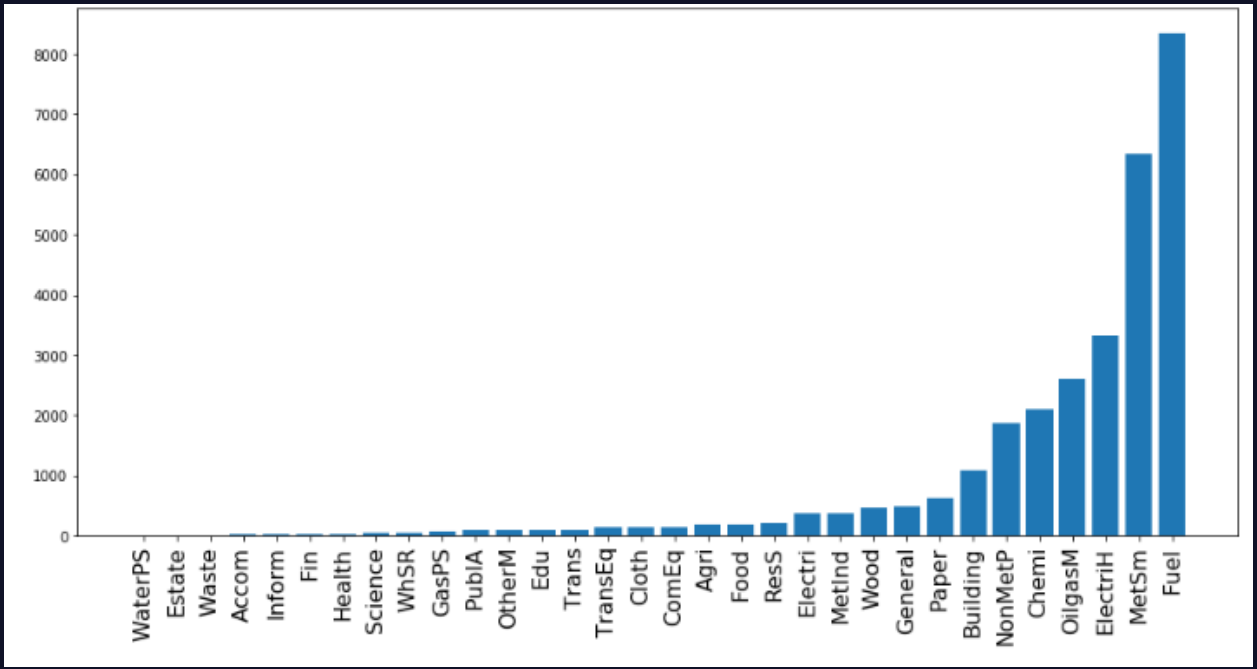
Financial flows, bln. $, 2000-2030y.y.



Structure of import from China



Structure of export from Russia to China



List of Research Indicators

Area	Indicator	Code	Source
Social	Population	P	EPS database http://olap.epsnet.com.cn/
	Unemployment rate	UR	EPS database http://olap.epsnet.com.cn/
	Urban Land area, sq. km	LA	EPS database http://olap.epsnet.com.cn/
	Highway density	HD	EPS database http://olap.epsnet.com.cn/
	Passenger traffic	PT	EPS database http://olap.epsnet.com.cn/
	Average number of trips per person	TPP	EPS database http://olap.epsnet.com.cn/
	Number of employed persons	EP	EPS database http://olap.epsnet.com.cn/
Economic	GDP	GDP	EPS database http://olap.epsnet.com.cn/
	GDP/person	GDP—P	EPS database http://olap.epsnet.com.cn/
	Total investments in enviornmental pollution control	TIEPC	EPS database http://olap.epsnet.com.cn/
	Energy Efficiency Rating	ENR	ERA- Interfax methodology calculation
	Energy consumption (10 thousands of standard coal)	EC	EPS database http://olap.epsnet.com.cn/
	Technological Efficiency Rartiong	TE	ERA- Interfax methodology calculation
Enviornmental	Ratio of wilderness areas	RWA	EPS database http://olap.epsnet.com.cn/
	Ratio of protected wilderness areas	RPWA	EPS database http://olap.epsnet.com.cn/
	Ratio wilderness area/population	RWP	EPS database http://olap.epsnet.com.cn/
	Total water consumption	TWC	EPS database http://olap.epsnet.com.cn/
	Consumption of Gasoline	GC	EPS database http://olap.epsnet.com.cn/
	Hazardous Waste	HW	EPS database http://olap.epsnet.com.cn/
	Waste Water Discharge	WW	EPS database http://olap.epsnet.com.cn/
	CO2 emissions	CO2	EPS database http://olap.epsnet.com.cn/
	Eco-Efficiency Rating	EER	ERA- Interfax methodology calculation

Results

It was analyzed four scenarios of the China provinces production and supply flows after the coronavirus outbreak. The main Authors recommendation – we needn't to carry out any segregation of consumers. It is necessary to distribute the damage as evenly as possible. It would allow the economy to suffer the least damage and recover faster. If we chose one, single out and support someone (scenarios 2-4), the economic decline would be more significant and the damage from the production decline would be also harmful.

Before the crisis, financial flows between China and Russia increased and growth was planned in the coming years. However, in the post-coronavirus period, it is difficult to make any forecasts on the level of trade. The situation can develop unpredictably. Besides, it is now a real challenge for the Chinese economy to stop importing cases of coronavirus infection from abroad, as there are more cases of coronavirus infection and deaths in the US and Europe than in China.

It is expected that due to falling oil and asset prices, the PRC will buy up assets in the Russian Federation, which will affect the promotion of Chinese cultural and business standards. Expected, relations between China and Russia will grow stronger in the future. Attention to the green economy must increase and digitalization methods for the economy for Nature will be developed.

Thanks for listening!