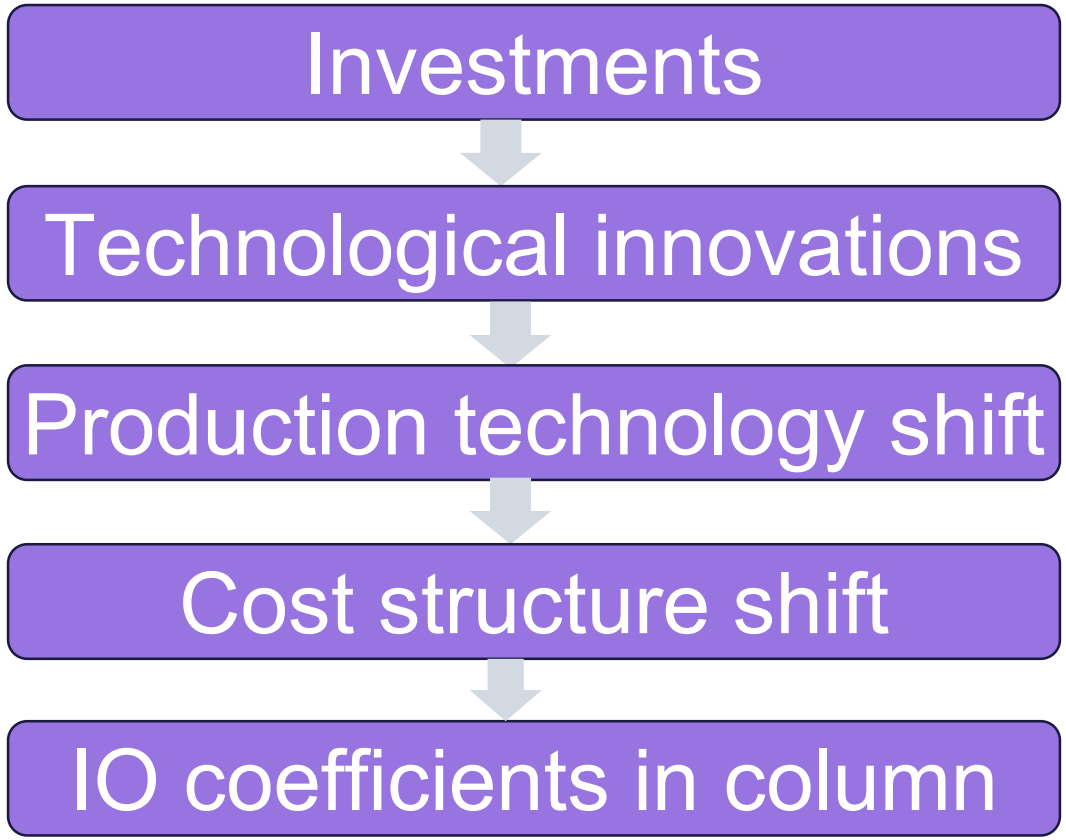
Input-output coefficients: econometrical approach

Sergey Milyakin

INFORUM conference, Sochi 2019

Institute of
Economic Forecasting
RAS

Technological shifts and IO coefficients



Methods and main technological shifts

Methods:
- Balance-based
- Technological (expert)
- Econometrical

We use:
- Linear trend (expert)
- Econometrical

Shifts:
- Transport electrification
- Partly and fully autonomous driving
- Digitalization
- Materials used

Transport electrification

Public transport electrification

Production: KamAZ, LiAZ, GAZ, Volgabus, Pk Transportnyye Sistemy, Zao "Trolza"

Electric batteries: LioTech-Innovations, import

Trucks electrification

Development: KamAZ, GAZ

Electric batteries: import

Partly and fully autonomous driving

Partly

GPS

Automatic braking system

Cruise control and monitoring

Parking assist system

Fully

Development and testing:
Yandex, Cognitive Technologies, GAZ

Transport electrification

Automobiles and automobile equipment production

Batteries replace ICE

Electrical equipment replaces diagonal

Non-ferrous metal in electric engine vs. ferrous metals in ICE

Non-ferrous metals replace ferrous metals

Land transport services: electricity replace fuel

Partly and fully autonomous driving

IEF RAS

Automobiles and automobile equipment production

Increase of electric and communication equipment share in automobile production cost

Electrical equipment replaces diagonal

Communication equipment replaces diagonal

Transport electrification & autonomous driving

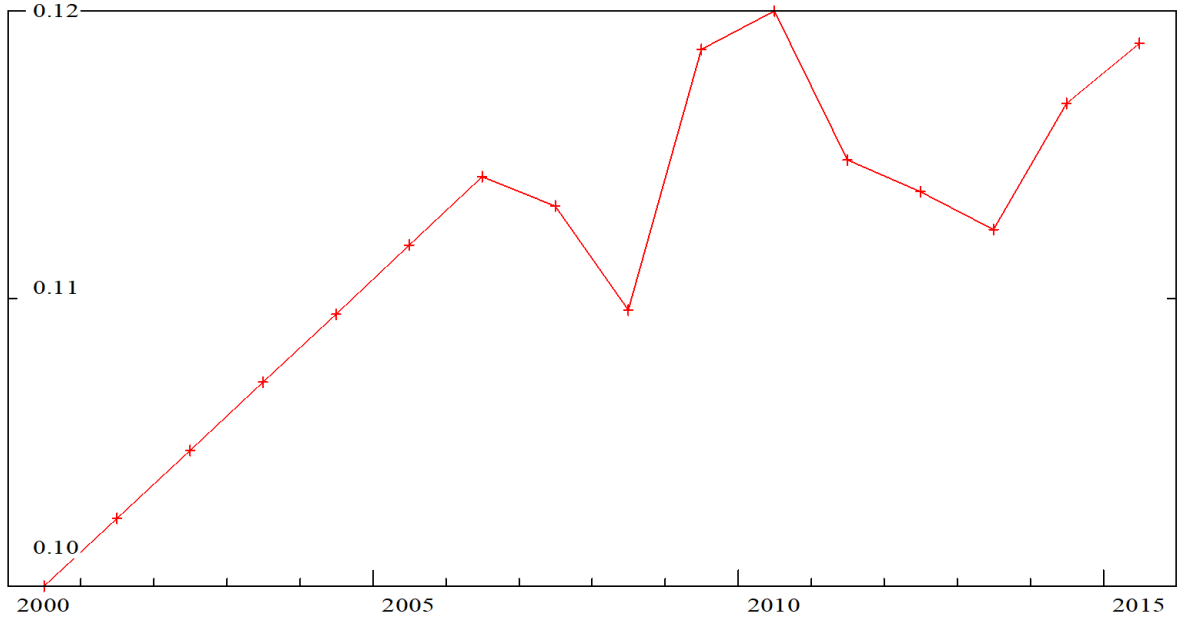
to “Automobiles, highway transport equipment "

From “Electrical equipment” (red line, left axis)

Diagonal (blue line, right axis)

Relation “Electrical equipment” / Diagonal

+16%

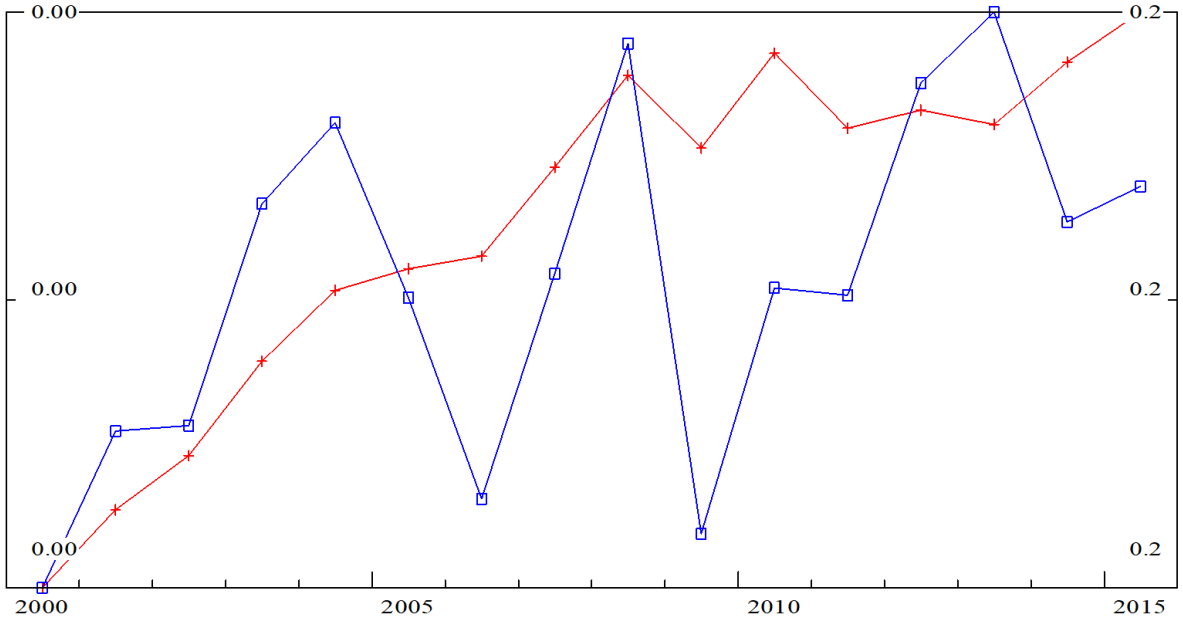


Transport electrification & autonomous driving

to “Automobiles, highway transport equipment "

From “Communication equipment” (red line, left axis)

Diagonal (blue line, right axis)



Relation “Communication equipment” / Diagonal

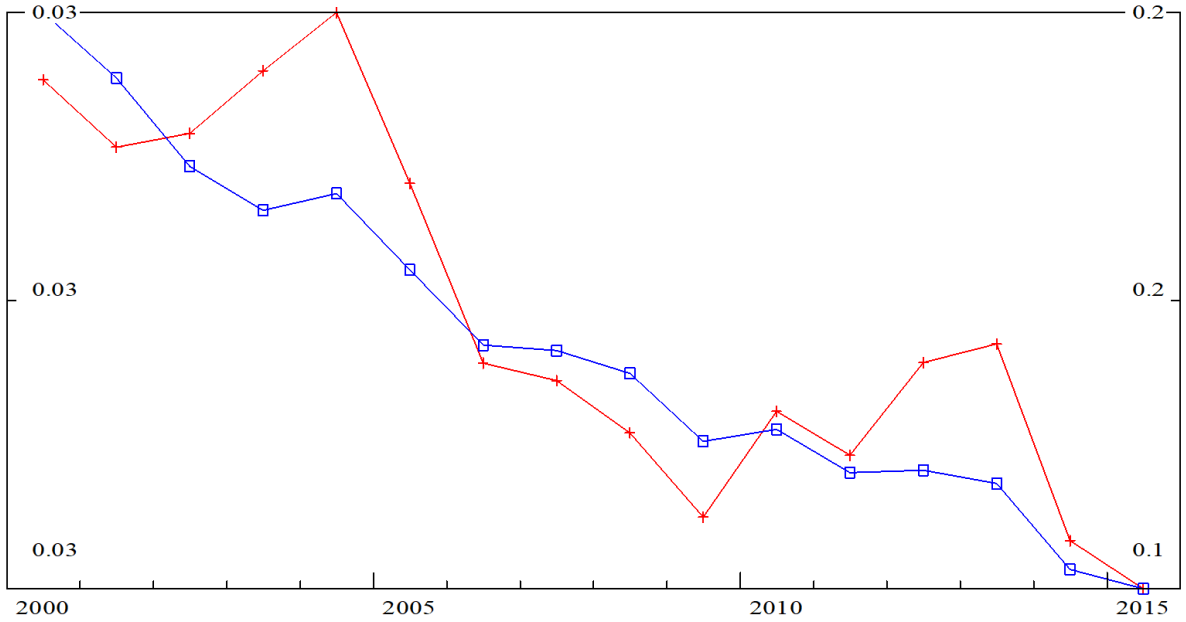
+54%

Transport electrification & autonomous driving

to “Automobiles, highway transport equipment "

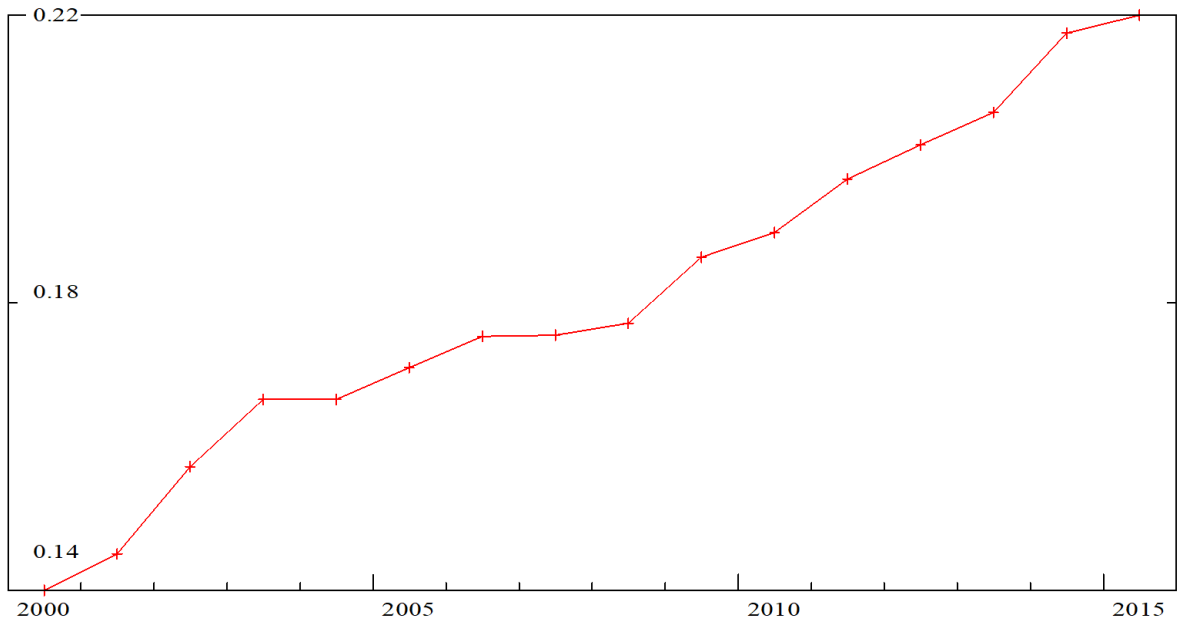
From “Non-ferrous metals” (red line, left axis)

From “Ferrous metals” (blue line, right axis)



Relation “Non-ferrous metals” / “Ferrous metals”

+55%



Digitalization

All sectors

Improvement in management

Decrease in trade and transport margins

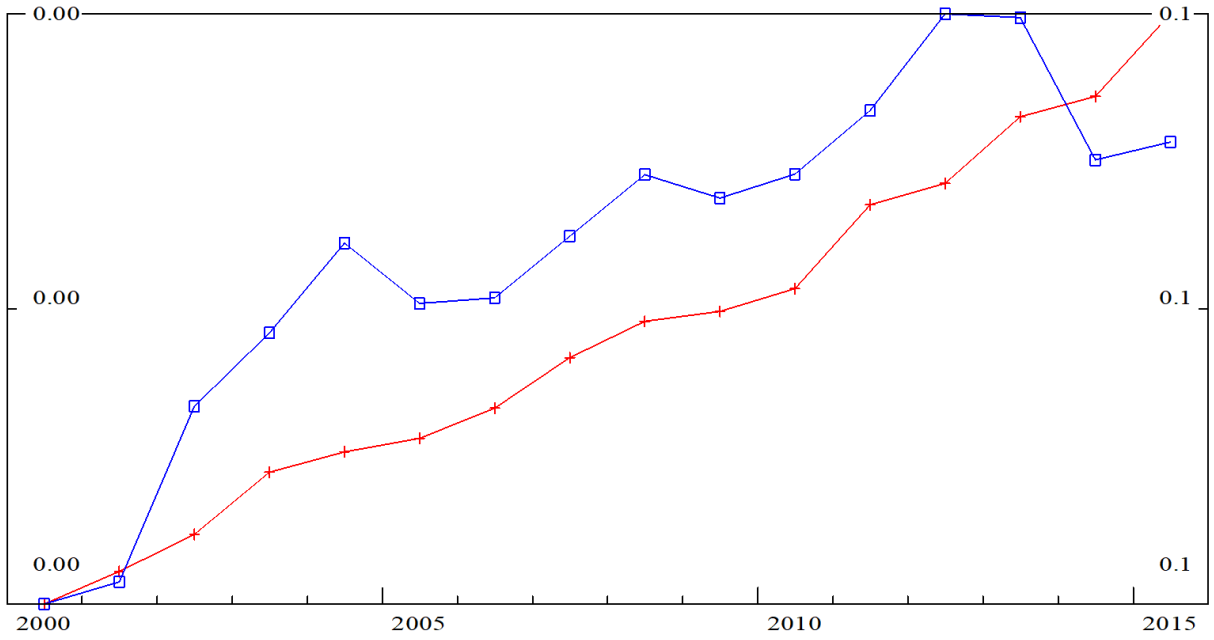
Communication services replace Trade and Transport for all sectors

Digitalization (Petroleum refining case)

to “Petroleum refining"

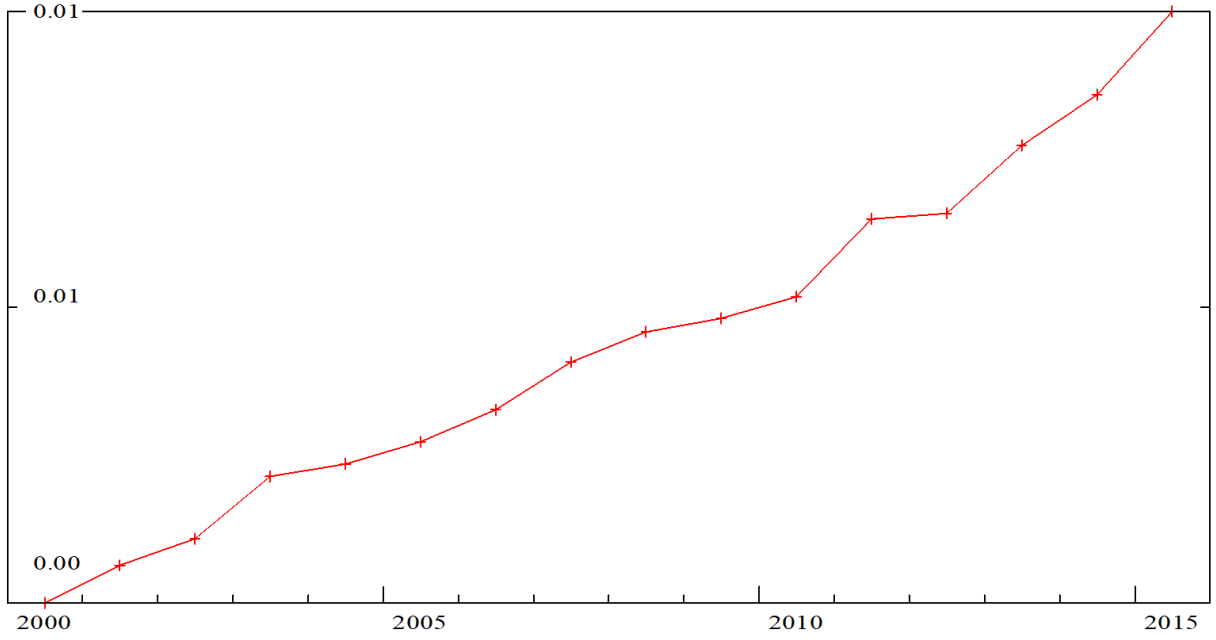
From “Communication” (red line, left axis)

From “Trade” (blue line, right axis)



Relation “Communication” / “Trade”

+227%

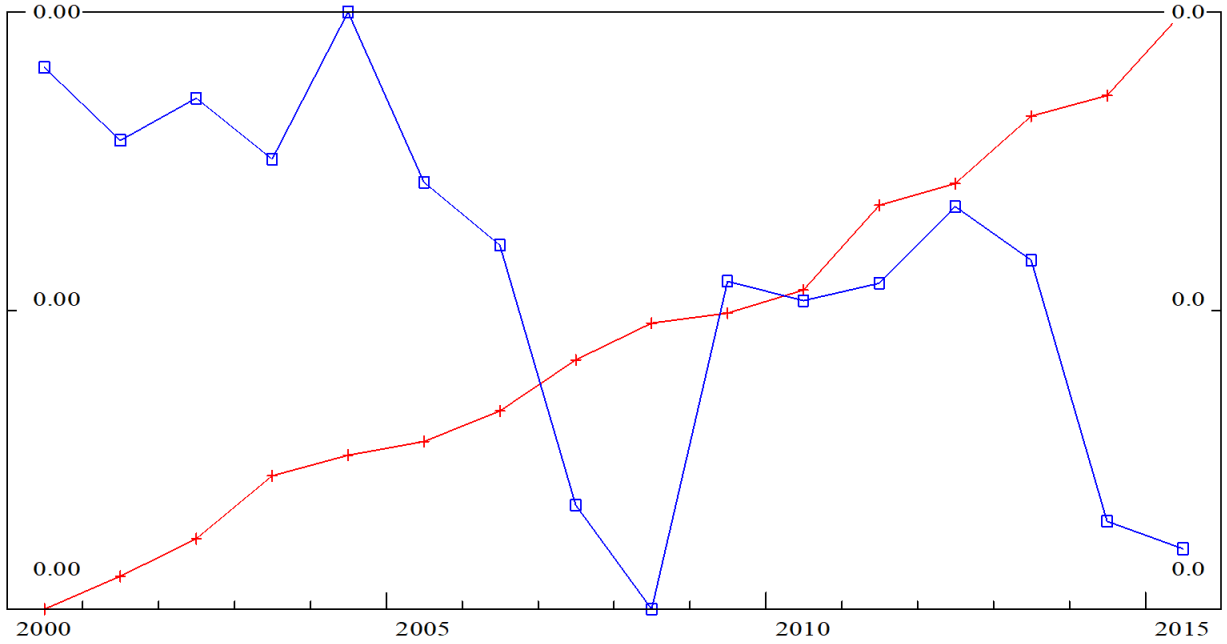


Digitalization (Petroleum refining case)

to “Petroleum refining"

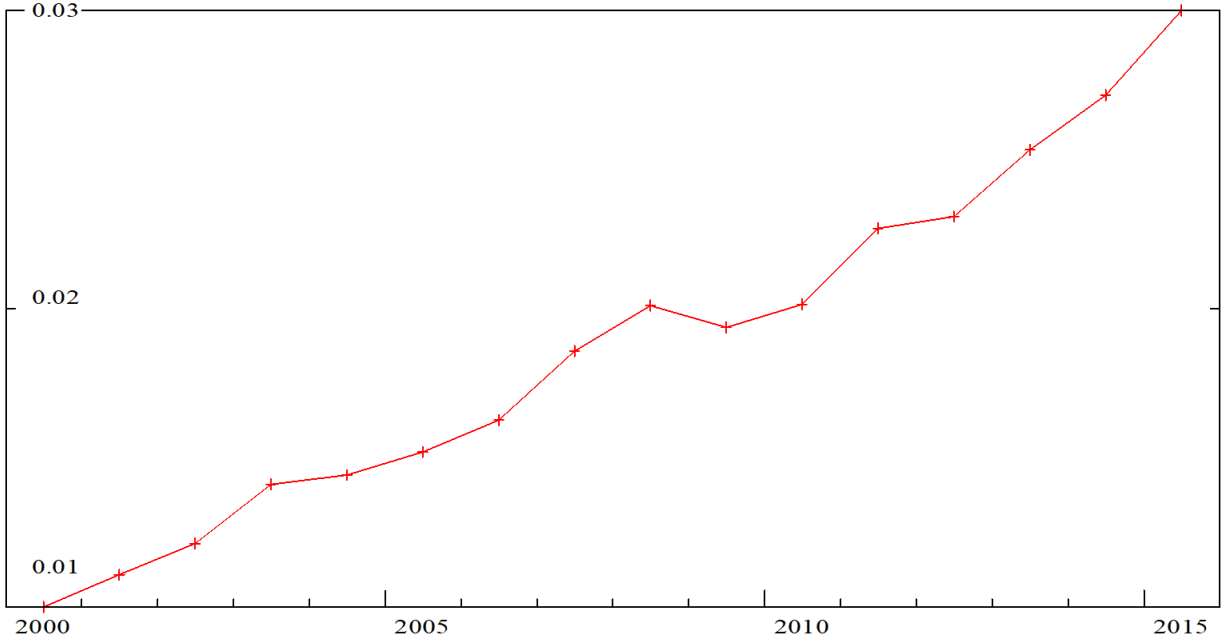
From “Communication” (red line, left axis)

From “Transport” (blue line, right axis)



Relation “Communication” / “Transport”

+312%

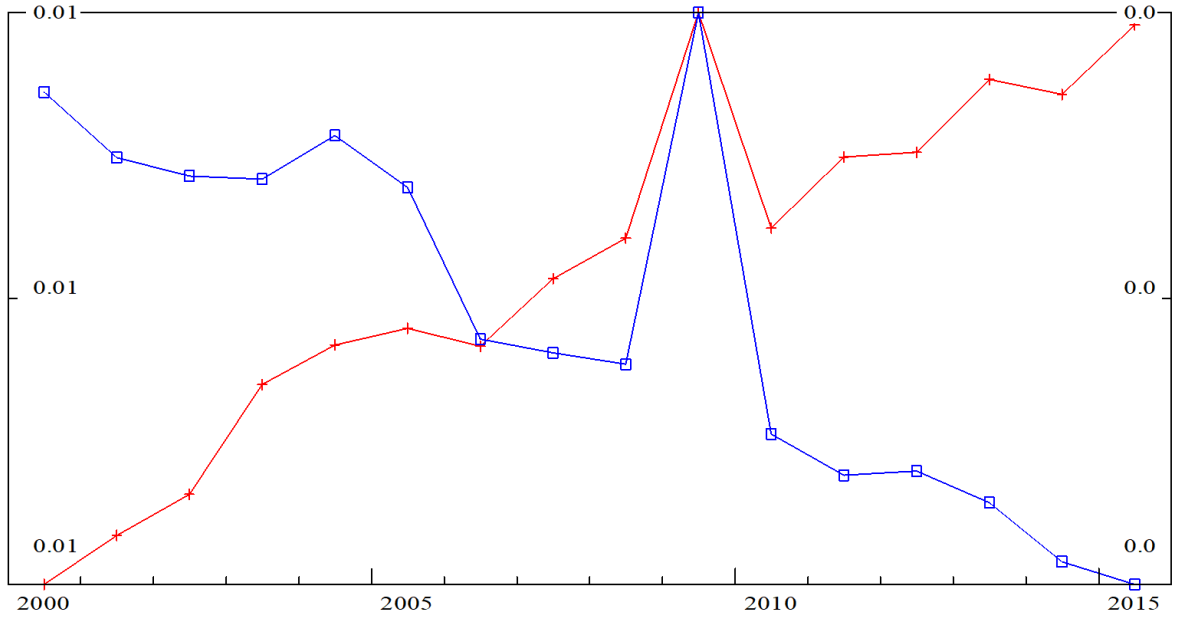


Digitalization (Machinery case)

to “Machinery"

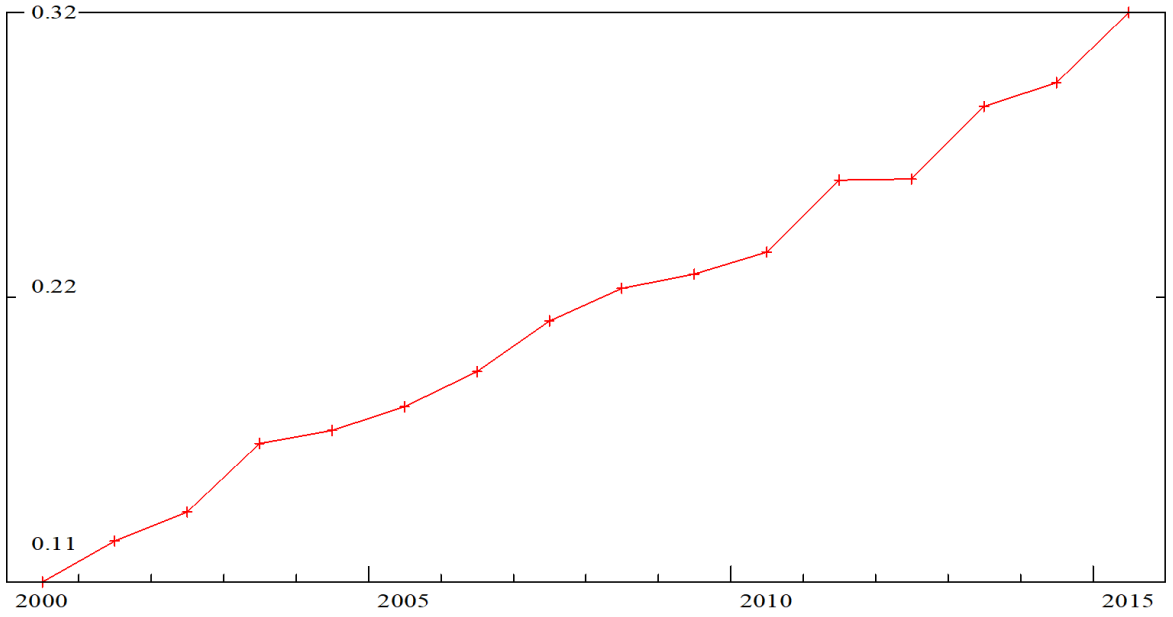
From “Communication” (red line, left axis)

From “Trade” (blue line, right axis)



Relation “Communication” / “Trade”

+200%



Digitalization (Machinery case)

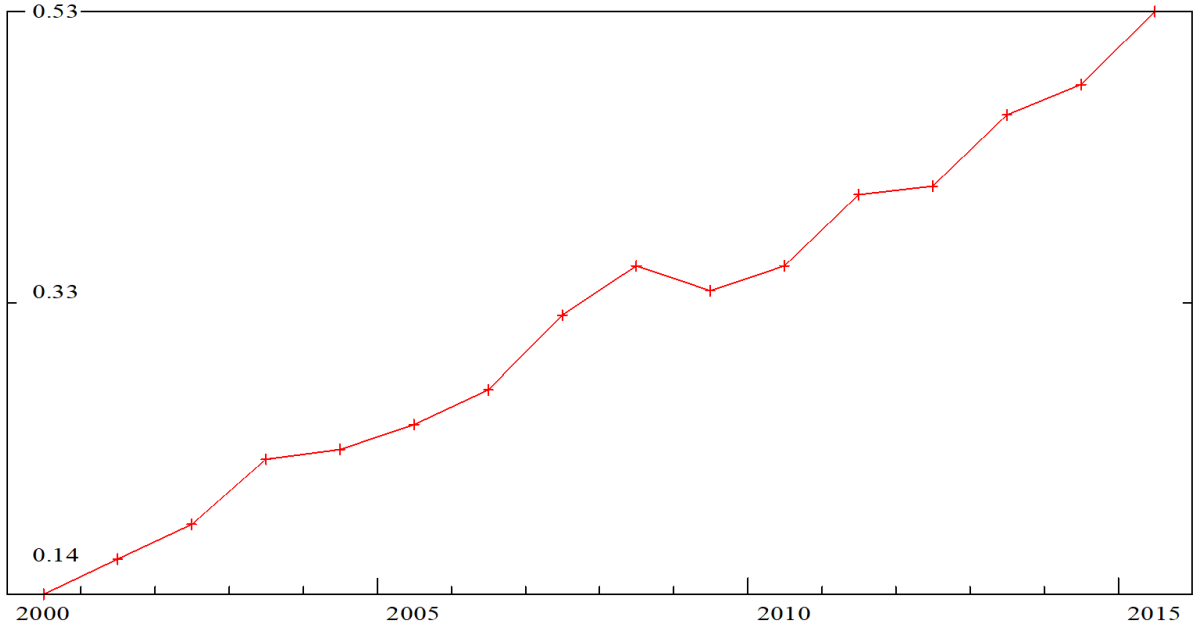
to “Machinery"

From “Communication” (red line, left axis)

From “Transport” (blue line, right axis)

Relation “Communication” / “Transport”

+278%



Composite materials extensive use (Construction case)

Construction

Extensive use
of composite materials in construction materials production

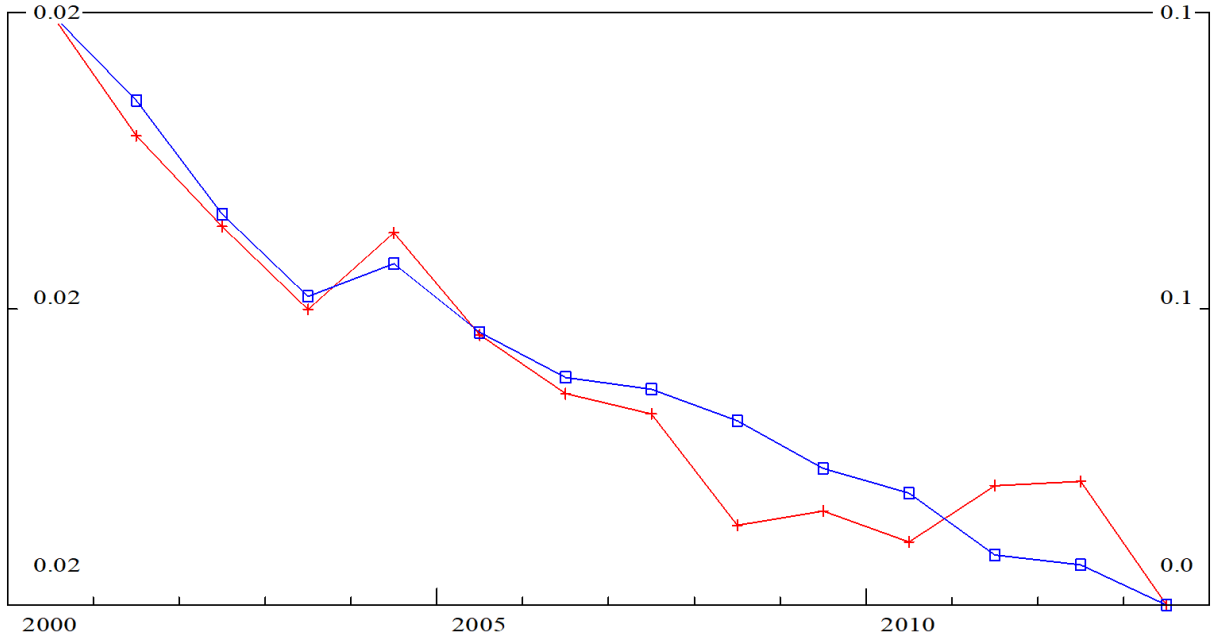
Chemicals replace Ferrous metals & Wood

Composite materials vs. Ferrous Metals

to “Construction "

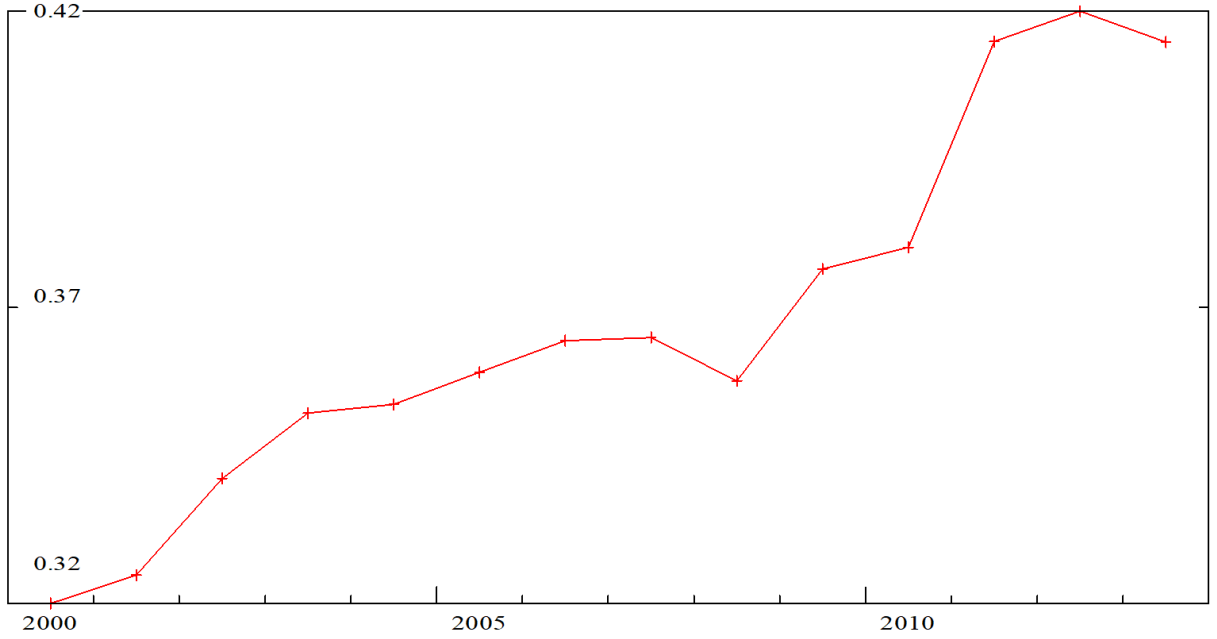
From “Chemicals” (red line, left axis)

From “Ferrous metals” (blue line, right axis)



Relation “Chemicals” / “Ferrous metals”

+29%

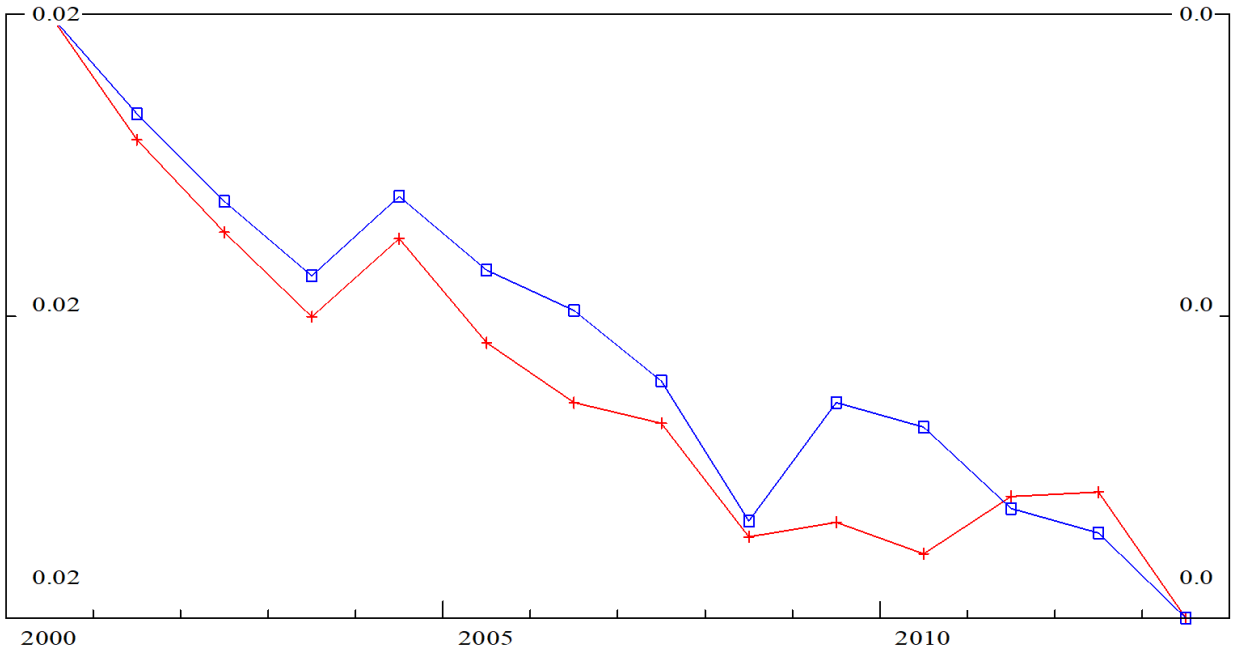


Composite materials vs. Wood

to “Construction"

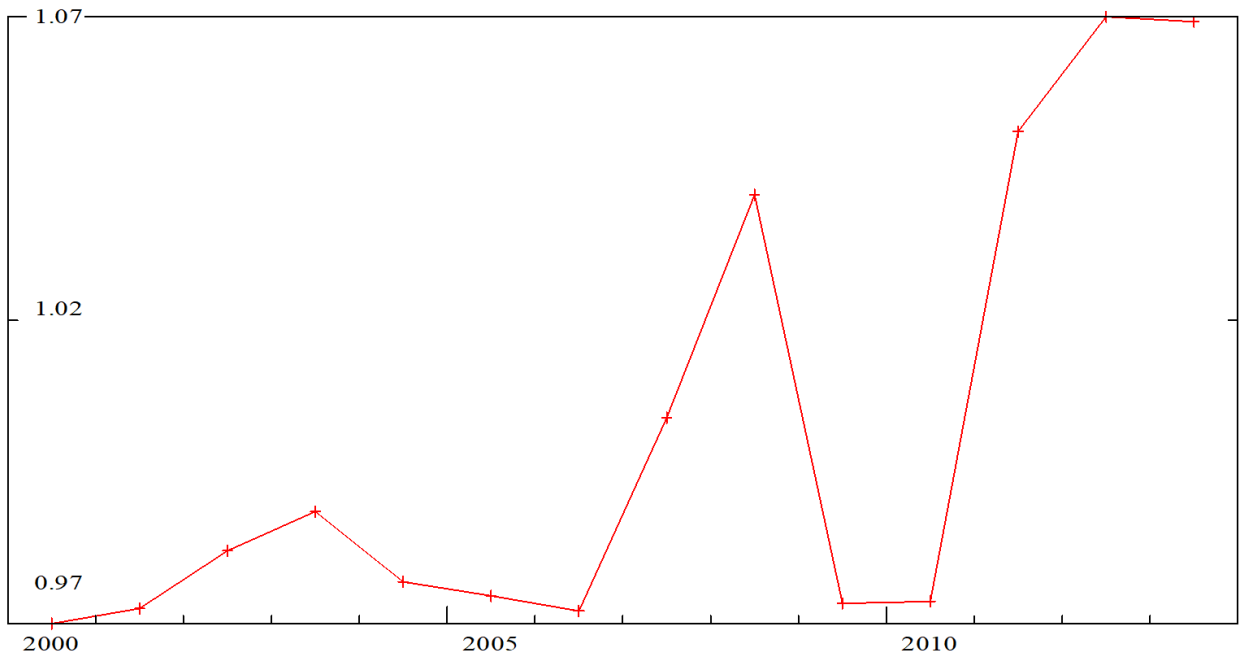
From “Chemicals” (red line, left axis)

From “Wood” (blue line, right axis)



Relation “Chemicals” / “Wood”

+10%



Composite materials extensive use (Automobile production case)

Automobiles and automobile equipment production

Extensive use
of composite materials in automobile equipment production

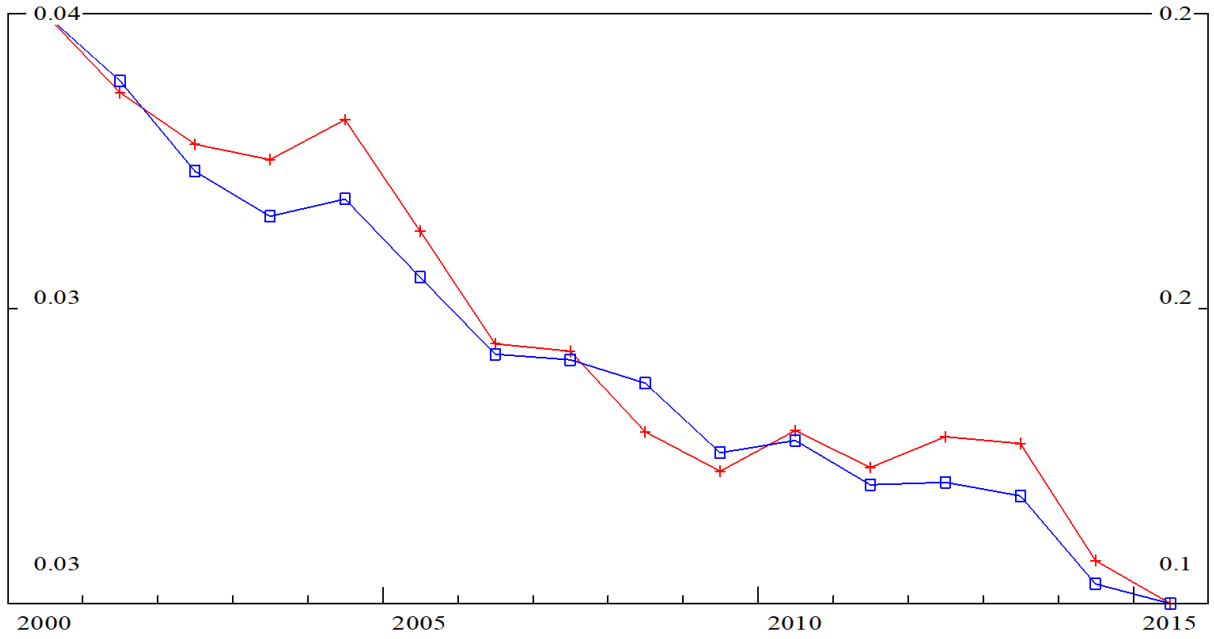
Chemicals replace Ferrous metals

Composite materials vs. Ferrous Metals

to “Automobiles, highway transport equipment "

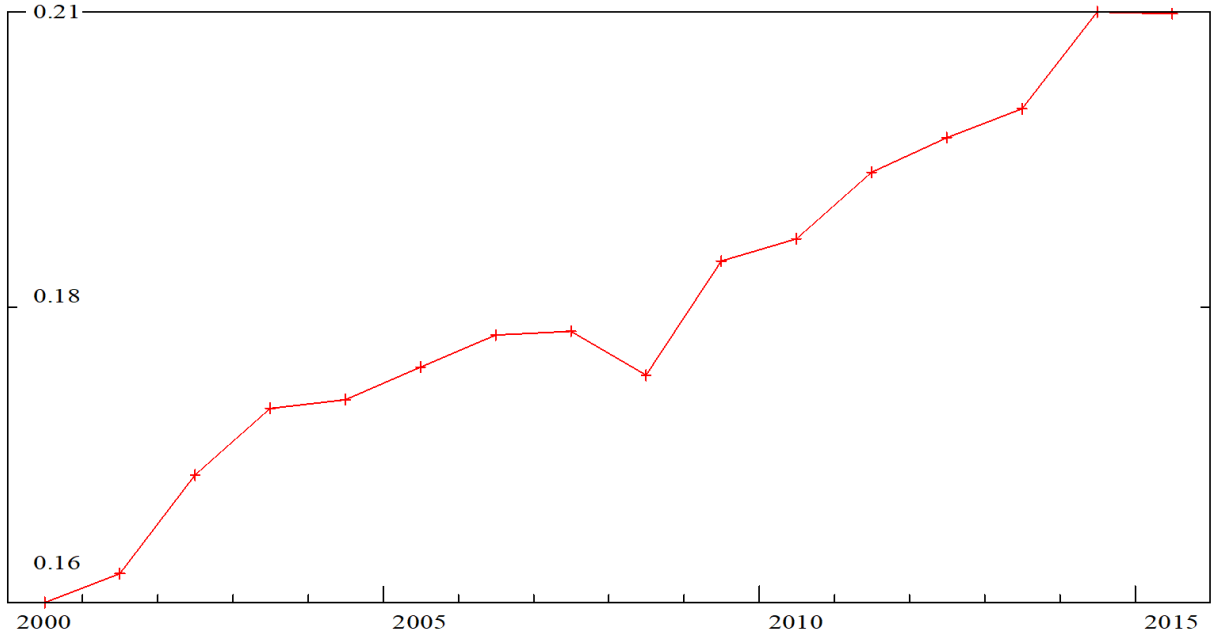
From “Chemicals” (red line, left axis)

From “Ferrous metals” (blue line, right axis)



Relation “Chemicals” / “Ferrous metals”

+30%

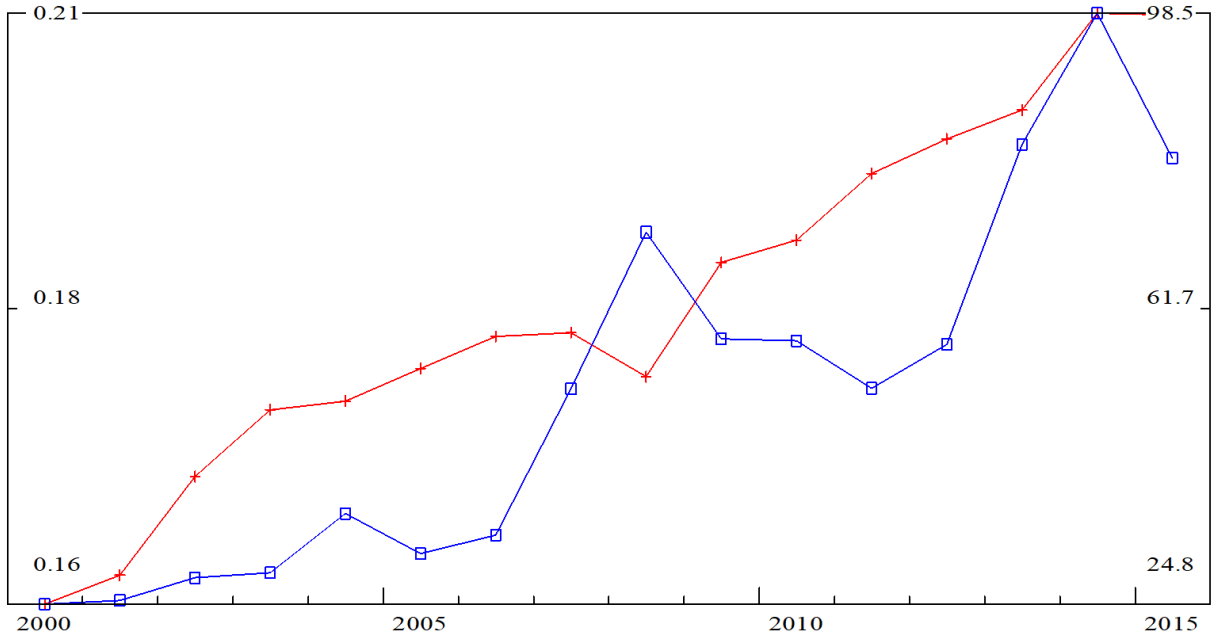


Composite materials vs. Ferrous Metals

From “Chemicals” to “Automobiles, highway transport equipment “/ From “Ferrous metals” to “Automobiles, highway transport equipment “

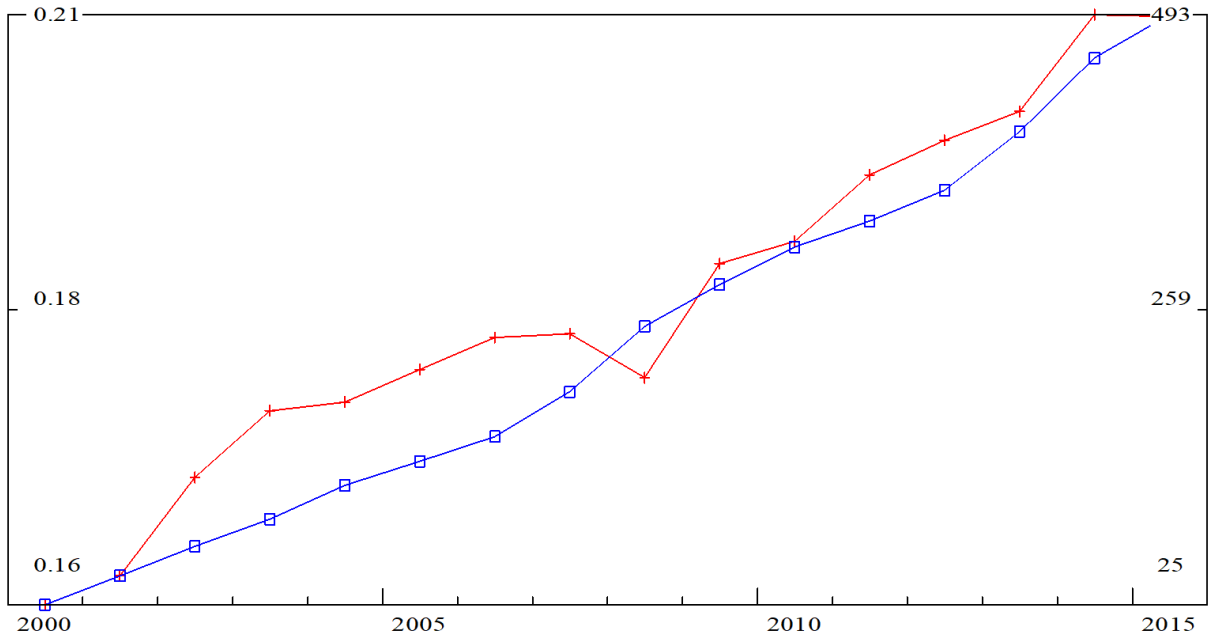
Relation (red line, left axis)

Investments (blue line, right axis)



Relation (red line, left axis)

Cumulated investments, 10% retirement (blue line, right axis)

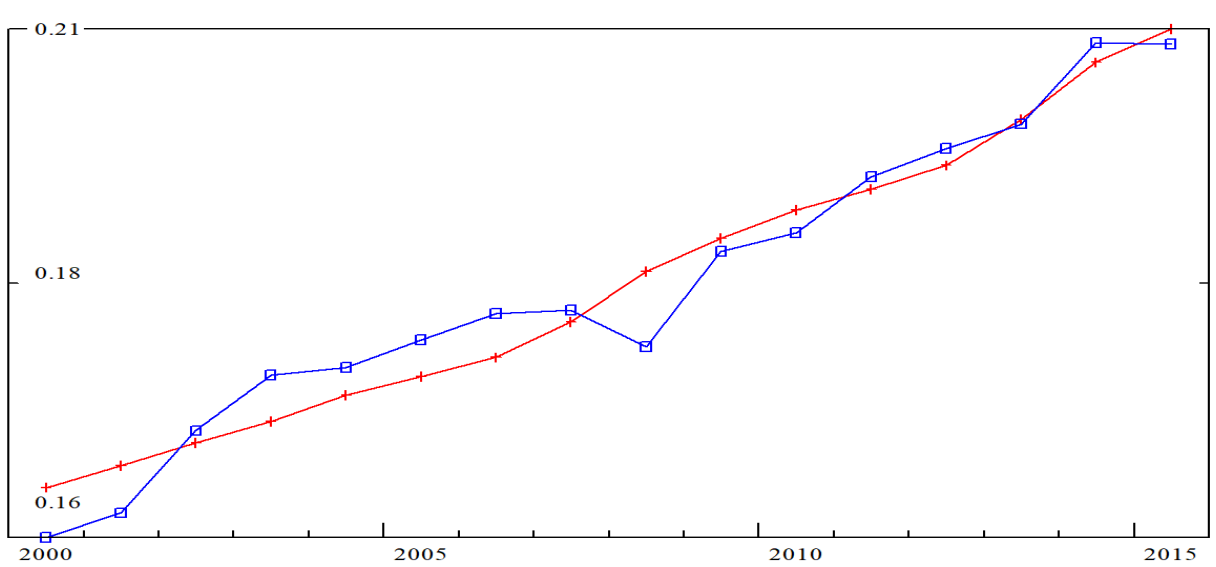


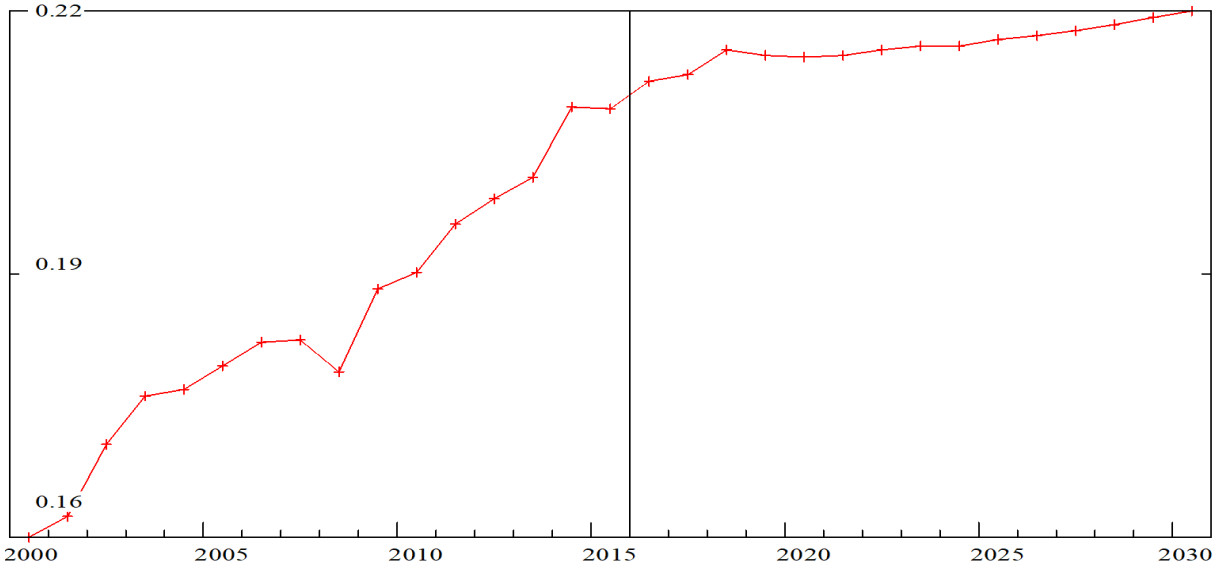
Composite materials vs. Ferrous Metals

From “Chemicals” to “Automobiles, highway transport equipment “/ From “Ferrous metals” to “Automobiles, highway transport equipment “

Predicted (red line, left axis)

Actual(blue line, right axis)





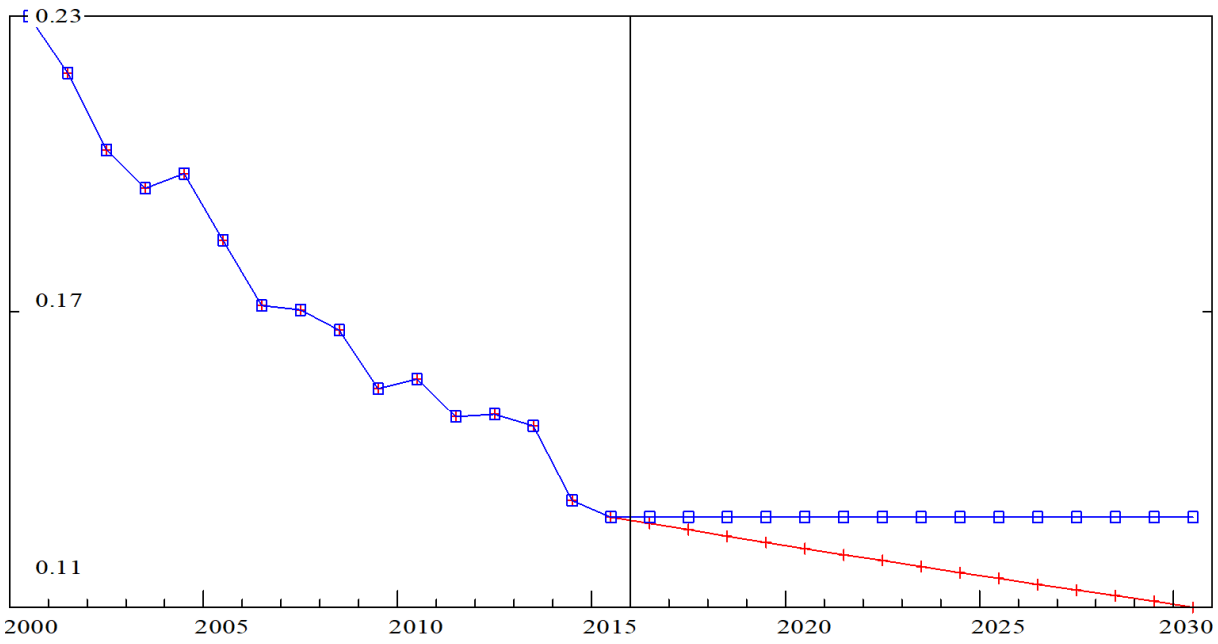
SEE =	0,00	RSQ =	0,94	RHO =	0,42	Obser =	16,00
SEE+1 =	0,00	RBSQ =	0,94	DW =	1,15	DoFree =	14,00
MAPE =	1,57						
Variable name	Reg-Coef	Mexval	Elas	NorRes	Mean	Beta	
AM1224divAM1624						0,18	
intercept	**0,16149**	2452,70	0,88	18,05	1,00		
cuminvdec24	**0,00010**	324,90	0,12	1,00	232,15	0,97	

Composite materials vs. Ferrous Metals

From “Ferrous metals” to “Automobiles, highway transport equipment “

New (red line): decline 0.5% yearly, 7.5% by 2030

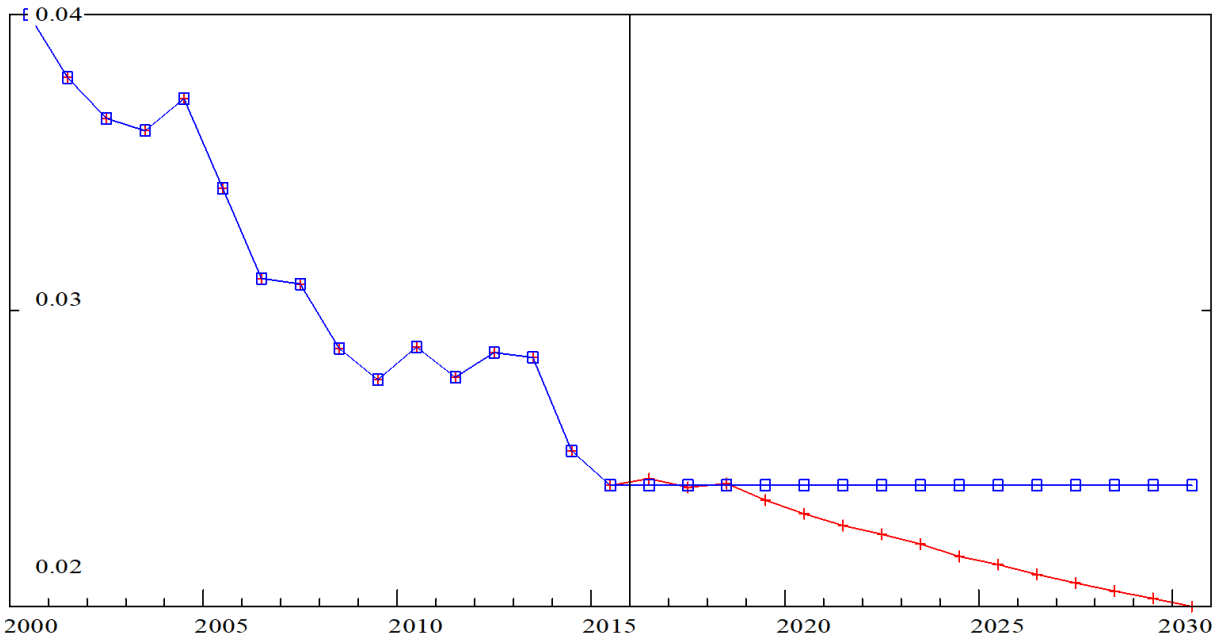
Old (blue line)



From “Chemicals” to “Automobiles, highway transport equipment “

New (red line)

Old (blue line)

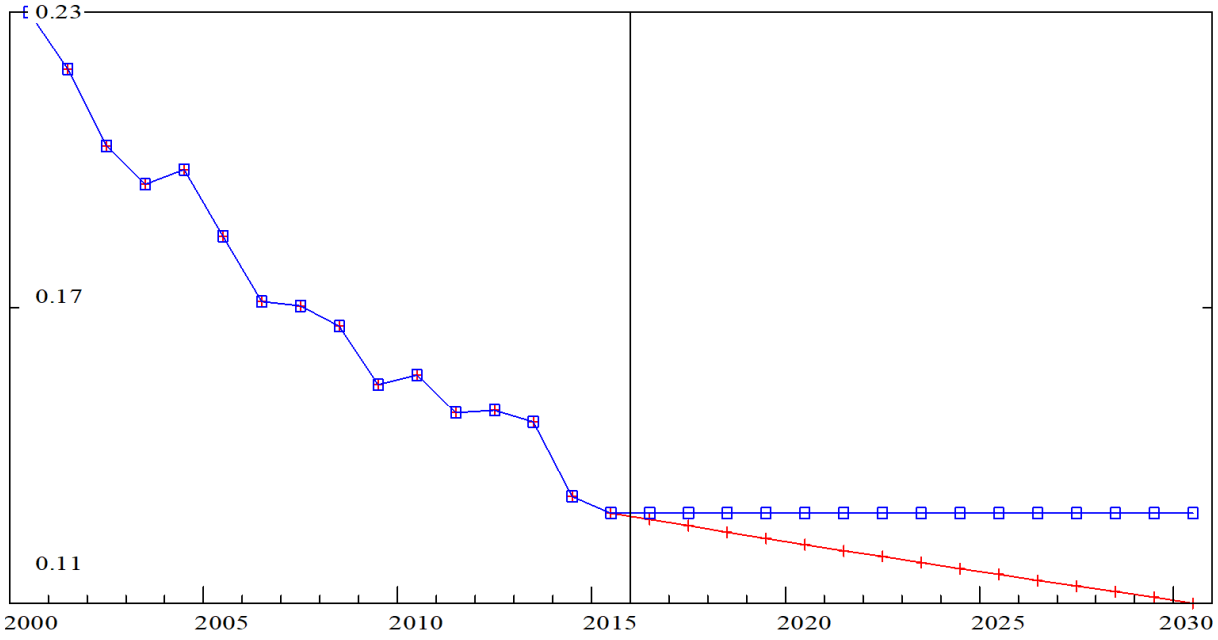


Electrification of transport (Non-ferrous Metals vs. Ferrous Metals)

From “Ferrous metals” to “Automobiles, highway transport equipment “

New (red line): decline 0.5% yearly, 7.5% by 2030

Old (blue line)



From “Non-ferrous metals” to “Automobiles, highway transport equipment “

New (red line)

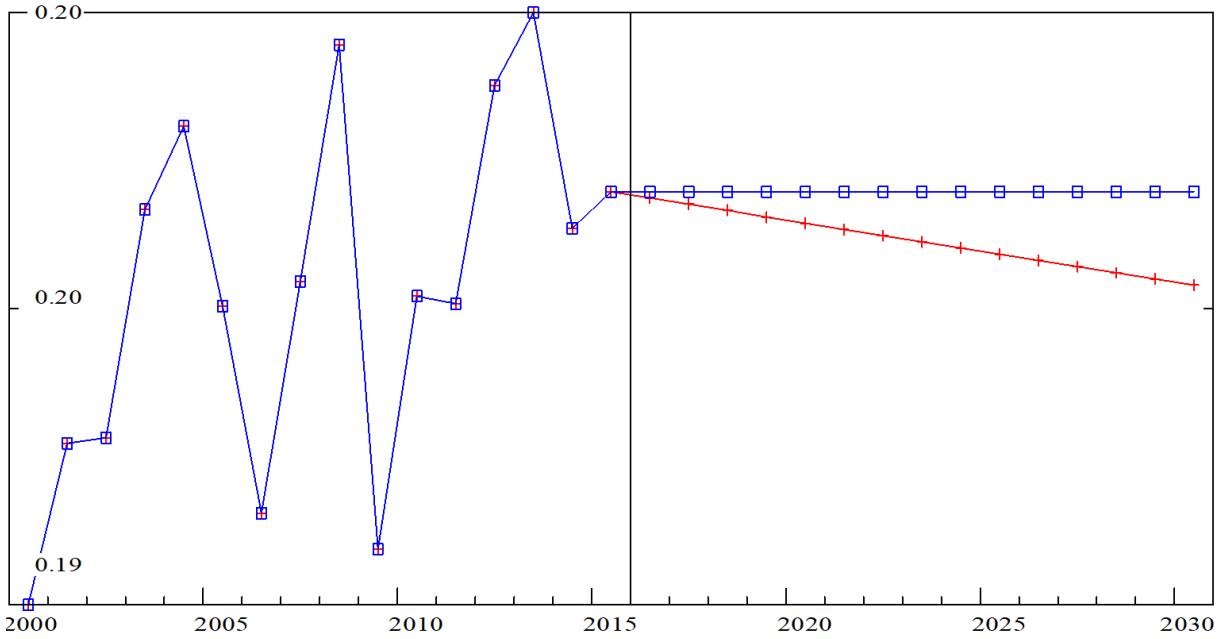
Old (blue line)

Electrification of transport & autonomous driving

Diagonal “Automobiles, highway transport equipment “

New (red line): decline 0.1% yearly, 1.5% by 2030

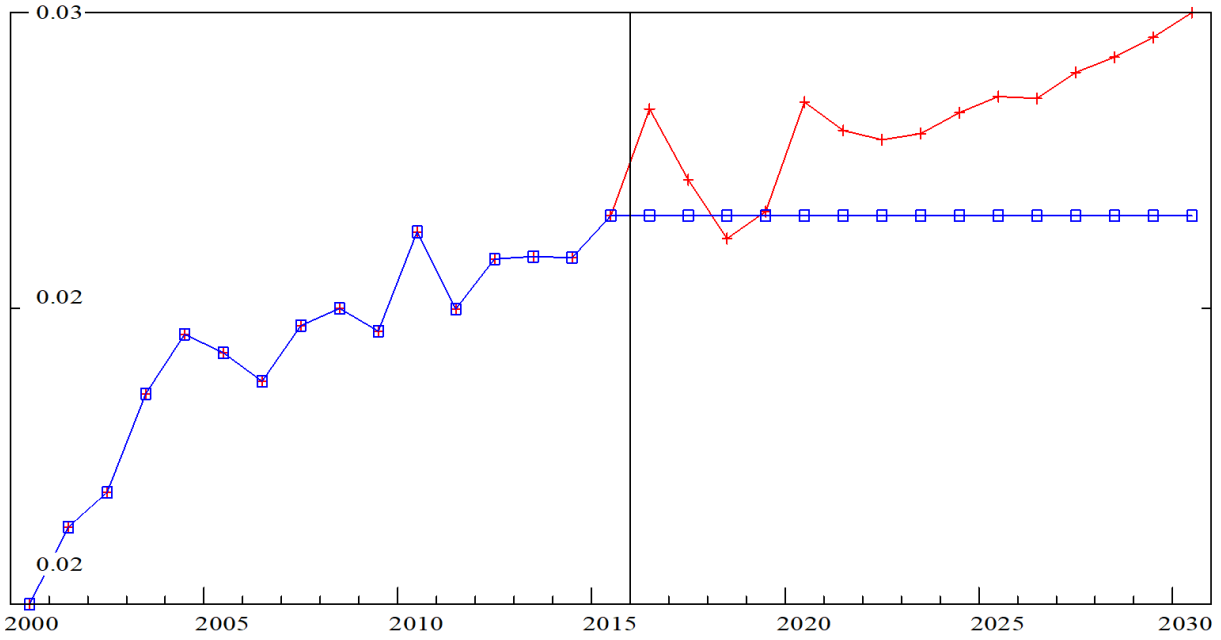
Old (blue line)



From “Electrical equipment” to “Automobiles, highway transport equipment “

New (red line)

Old (blue line)

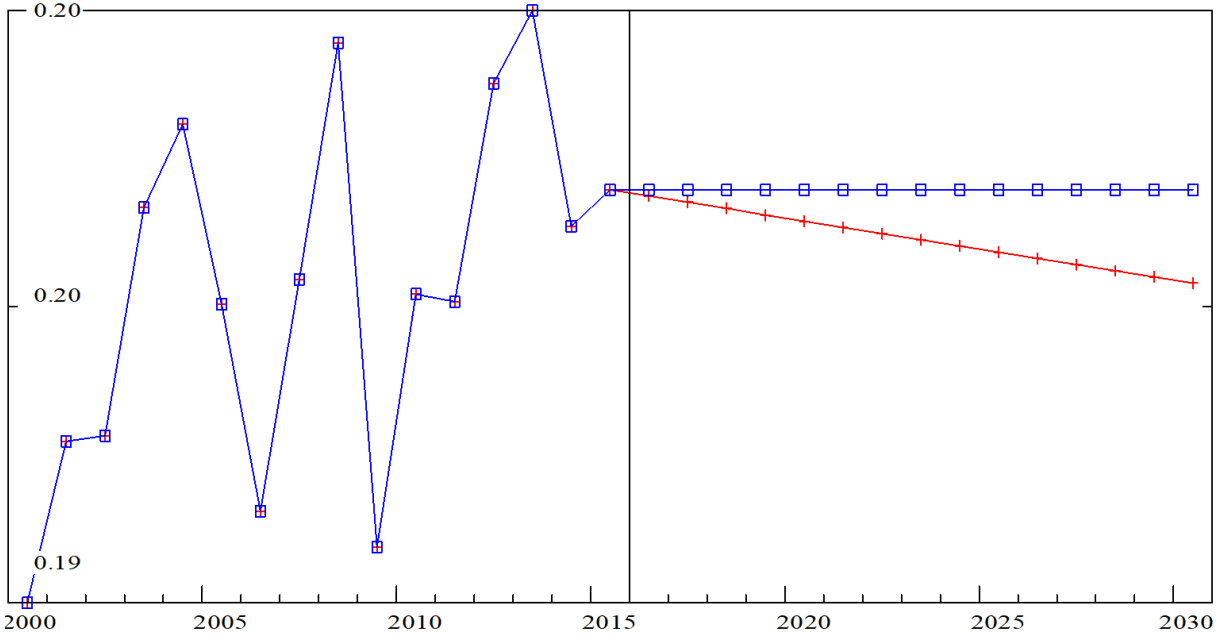


Autonomous driving

Diagonal “Automobiles, highway transport equipment “

New (red line): decline 0.1% yearly, 1.5% by 2030

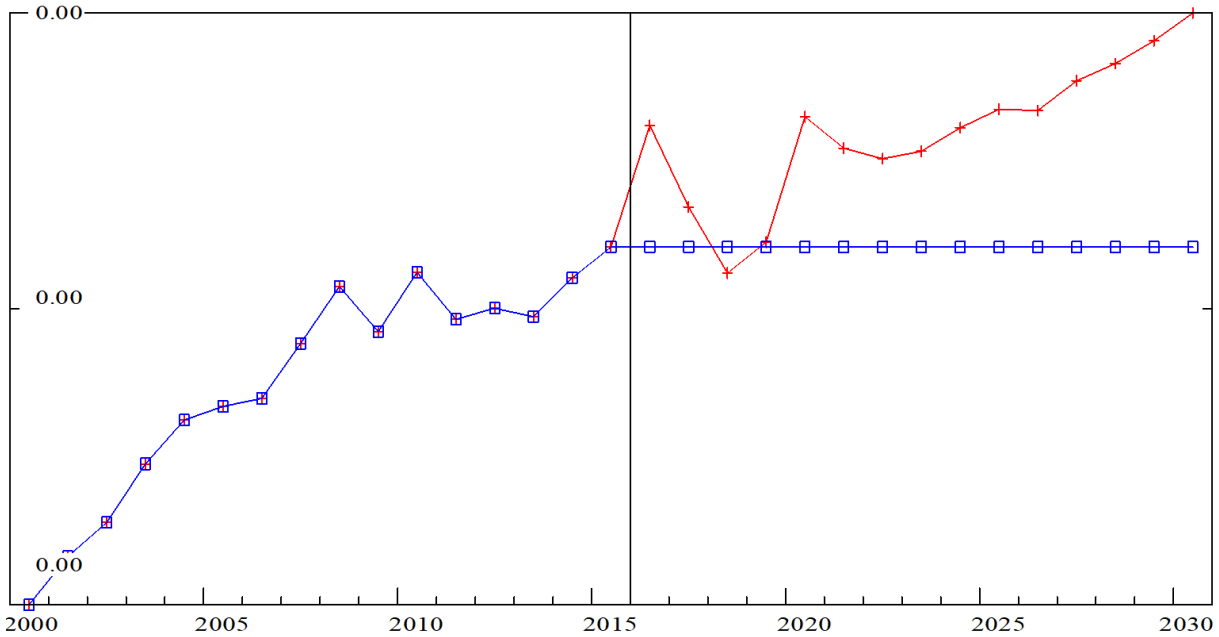
Old (blue line)



From “Radio, television, communication equipment” to “Automobiles, highway transport equipment “

New (red line)

Old (blue line)

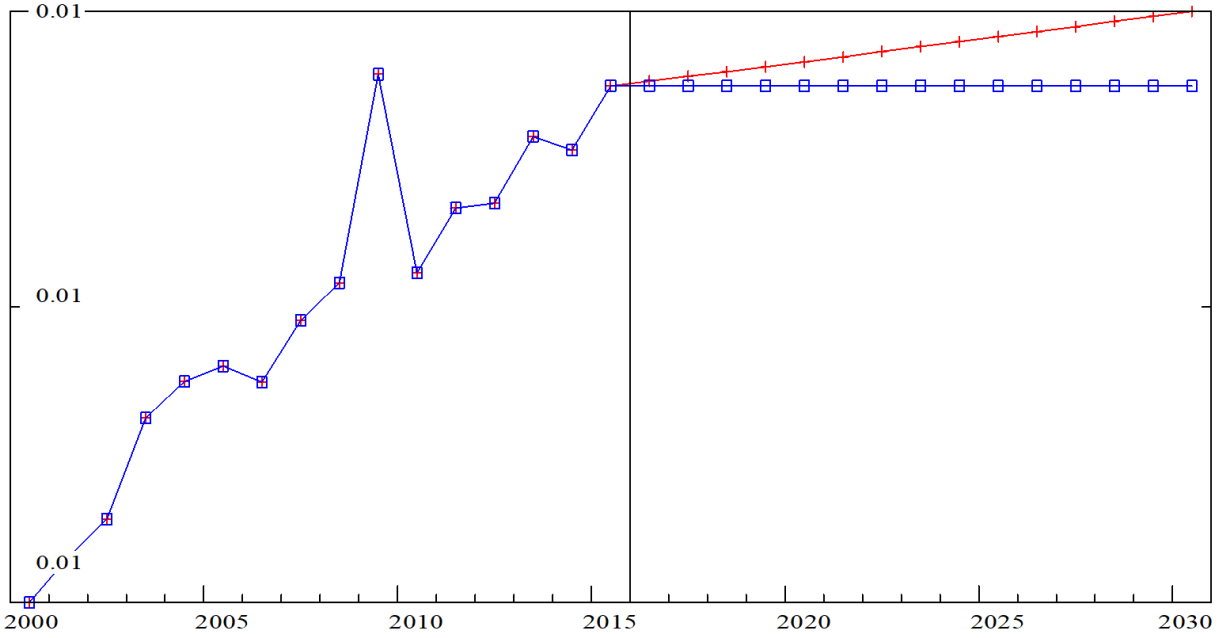


Digitalization (Machinery case)

From “Communication” to “Machinery“

New (red line): growth 0.5% yearly, 7.5% by 2030

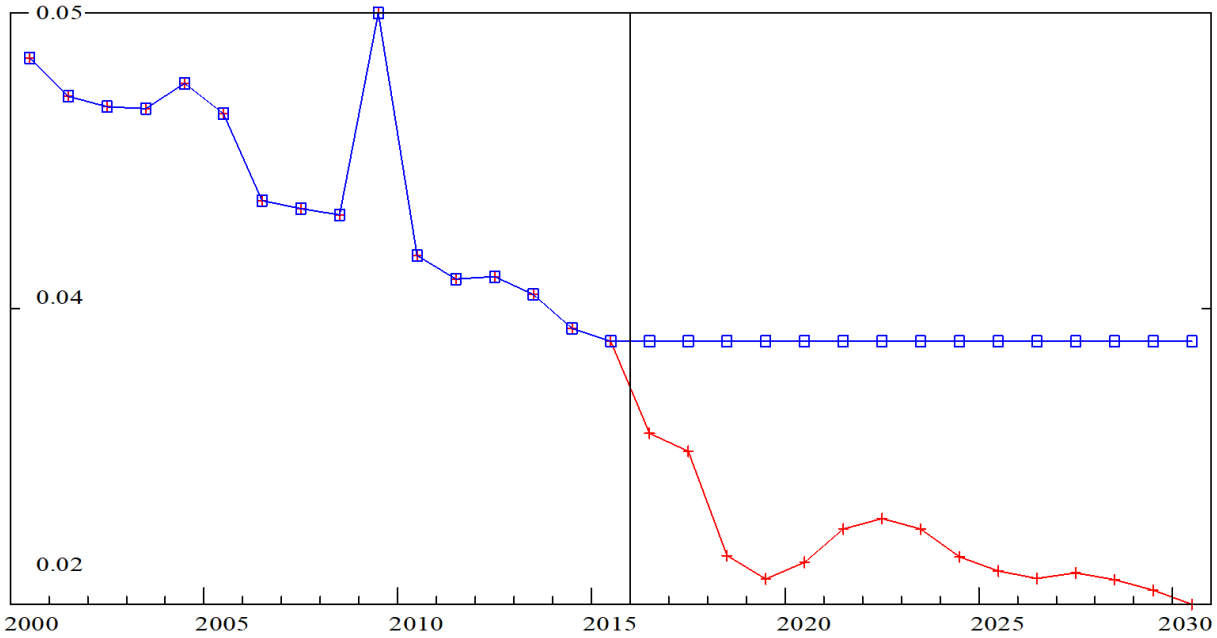
Old (blue line)



From “Wholesale and retail trade” to “Automobiles, highway transport equipment “

New (red line)

Old (blue line)

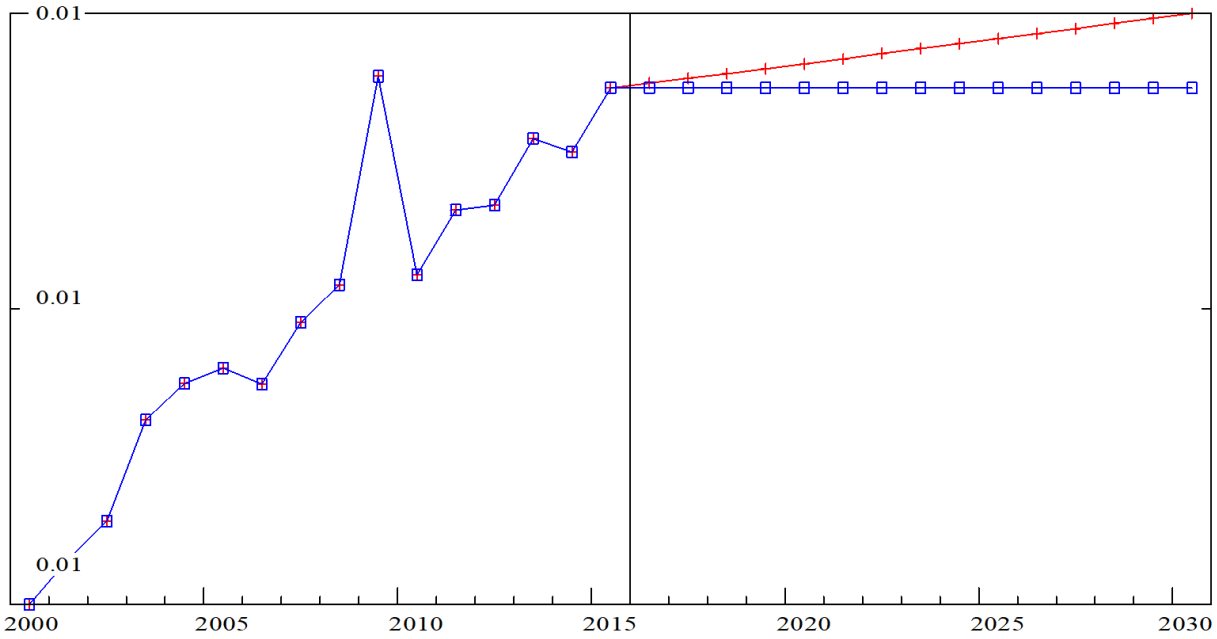


Digitalization (Machinery case)

From “Communication” to “Machinery“

New (red line): growth 0.5% yearly, 7.5% by 2030

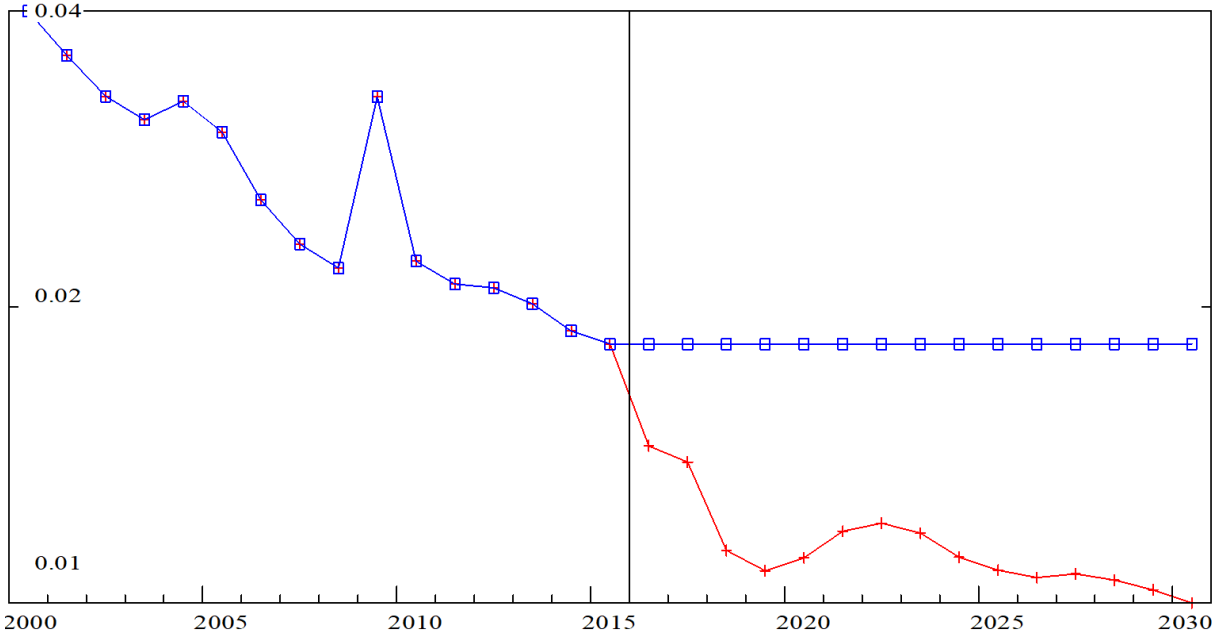
Old (blue line)



From “Transport and storage” to “Automobiles, highway transport equipment “

New (red line)

Old (blue line)

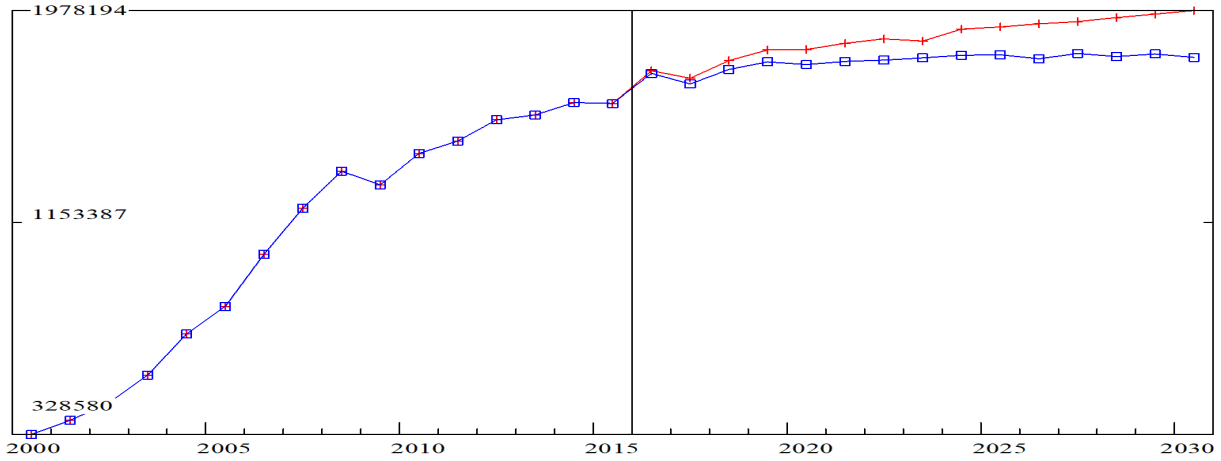


Outputs (constant 2010 prices, mln.rub)

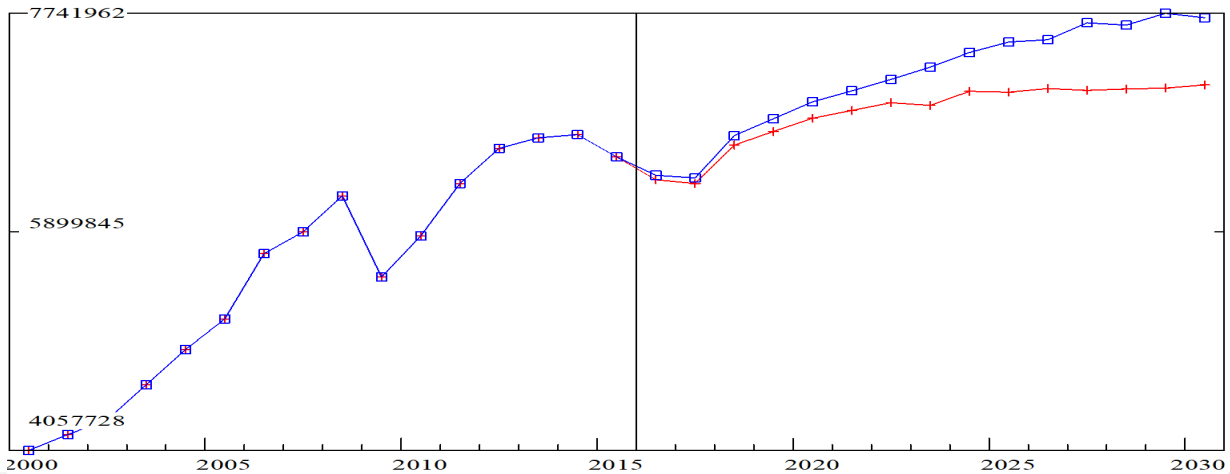
New (red line)

Old (blue line)

"Communication"



"Transport and storage"



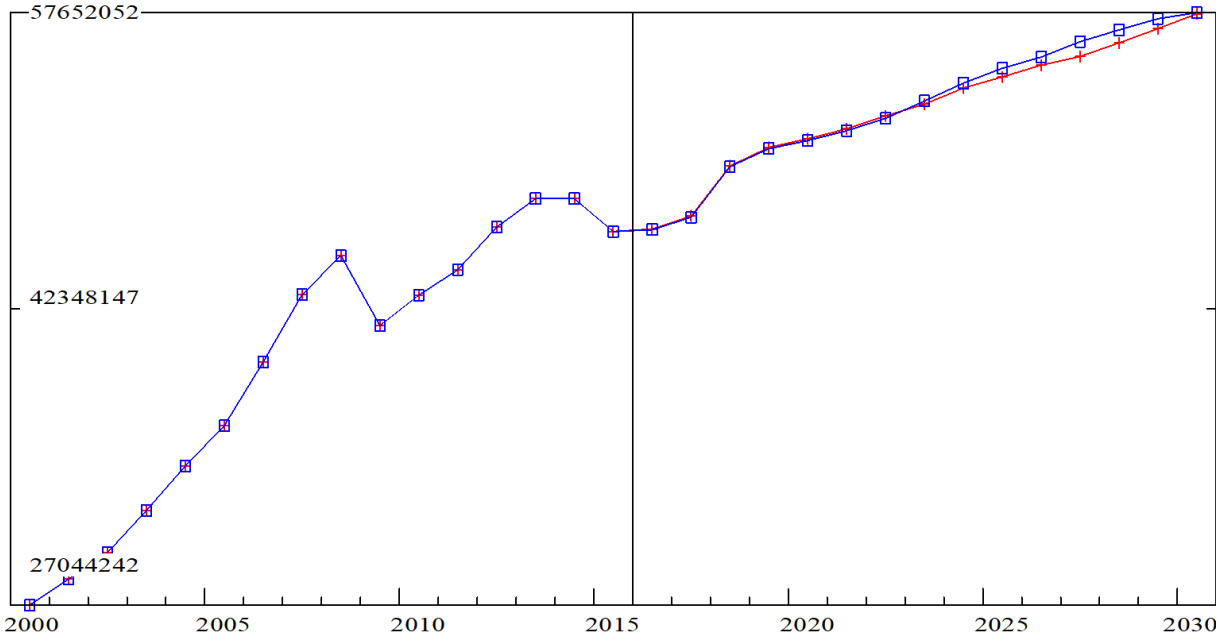
"Wholesale and retail trade"

Macro (constant 2010 prices, mln.rub)

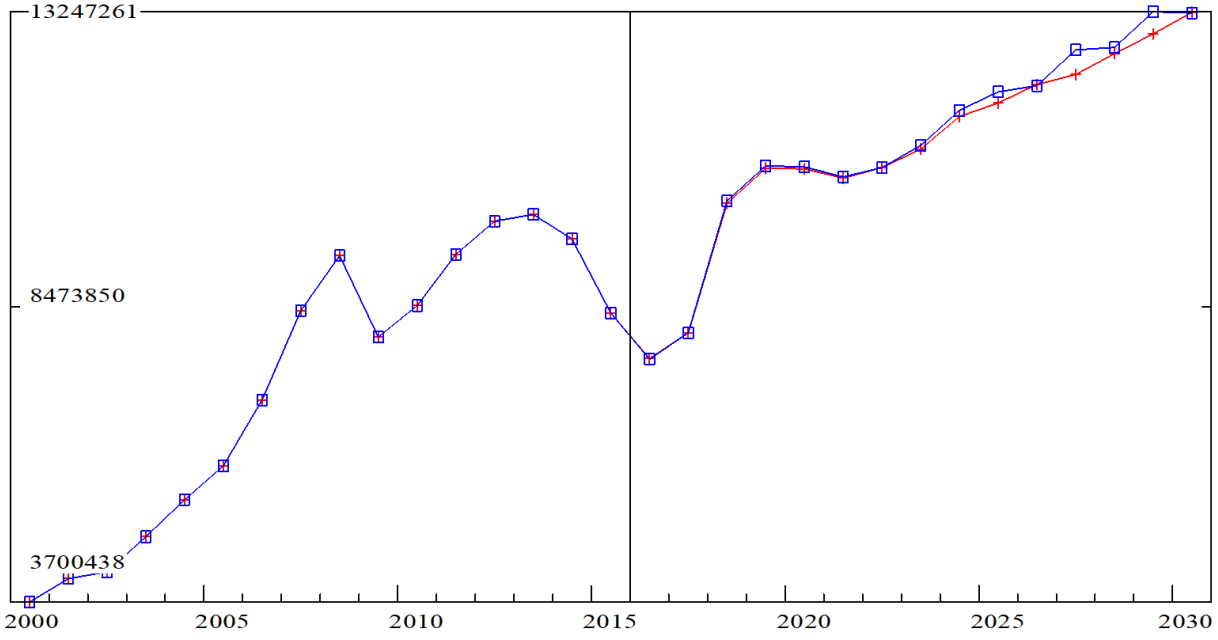
New (red line)

Old (blue line)

GDP



Investments



Conclusions and future plans

1. First step
2. Many coefficients are still linearly dynamicized
3. Some helpful methods can be applied
4. Cost structure in developed countries might be a reference point for cost structure in Russia in future

Contacts

www.ecfor.ru / milyakin

milyakinsergei@gmail.com