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Does Regional and Sectoral Aggregation Matter? Sensitivity Analysis in the Context of EU-Korea FTA



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Introduction

- CGE models vs. PE models for impact analysis of trade policy
 - CGE models have been criticized because they miss much of policy detail and face serious aggregation issues.
 - PE models are more disaggregated but lack internal consistency and have nothing to say about the economy-wide effects from trade reform.



Introduction

- Aggregation level is usually determined before running the models.
- Ample evidence that sectoral aggregation matters in trade analysis.
- Limited evidence about how regional aggregation level affects the results of CGE and PE applications.
- The objective of this study is to analyze how sectoral and regional aggregation level affects the results of CGE and PE models.



Introduction

- The FTA between EU and South Korea which became effective in November 2011 is used as an example.
- GTAP model with capital accumulation (Baldwin, 1992; Francois) and CAPRI (Common Agricultural Policy Regionalised Impact) model (Britz and Witzke, 2012) are used.



Literature review

- Grant, Hertel and Rutherford (2006), “Extending General Equilibrium to the Tariff Line: U.S. Dairy in the Doha Development Agenda”
- Lenzen (2011), “Aggregation versus Disaggregation in Input-Output Analysis of the Environment”
- Zhang (2013), “Sectoral aggregation bias in the accounting of emissions embodied in trade and consumption”

Sensitivity analysis with an Armington model

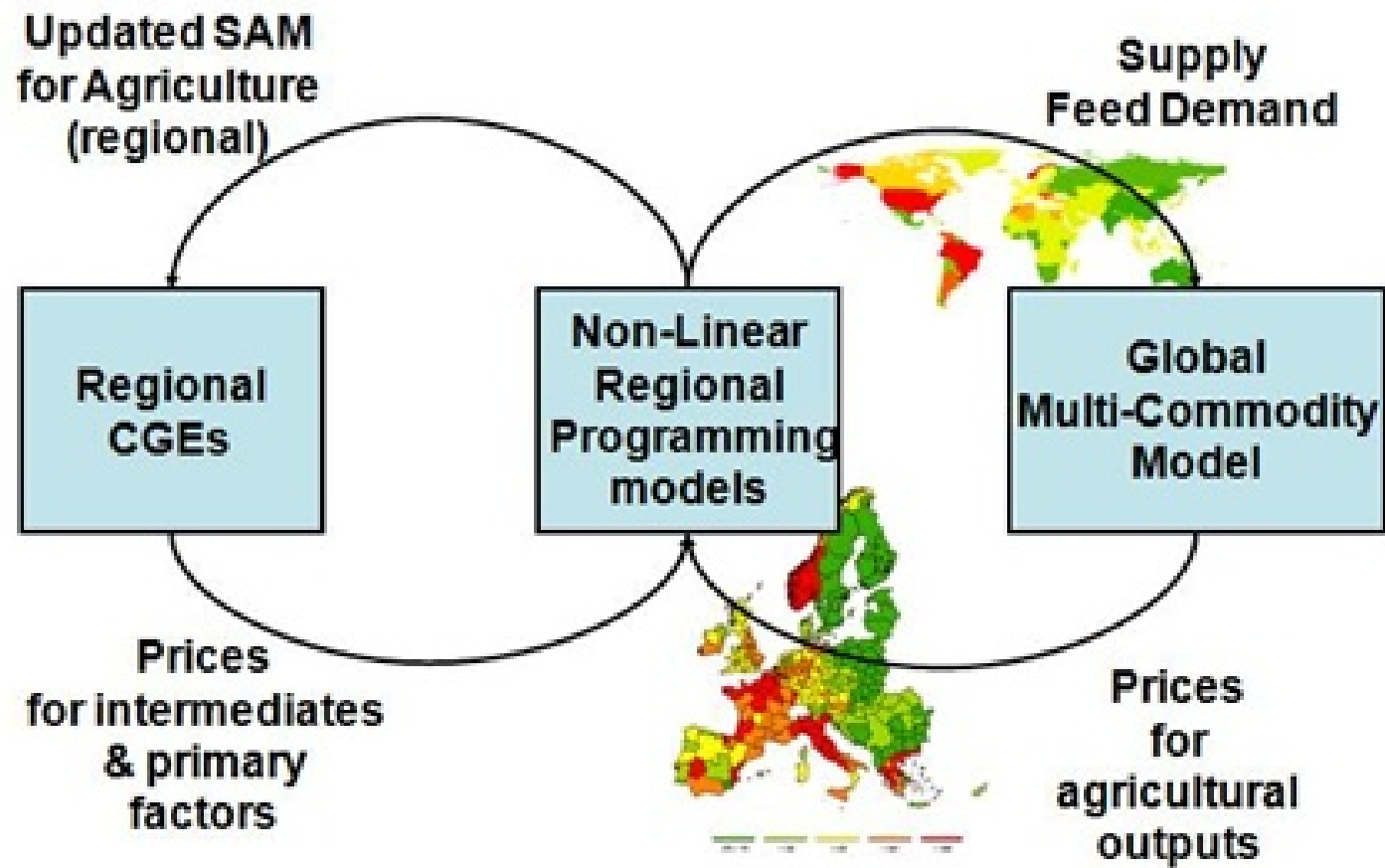




GTAP and CAPRI Models

- GTAP model with capital accumulation (Baldwin, 1992; Francois)
- CAPRI model (Britz and Witzke, 2012)

CAPRI Model



Sectors in GTAP model

1pdr	Paddy rice	14fsh	Fishing
2wht	Wheat	15cmt	Meat: cattle,sheep,goats,horse
3gro	Cereal grains nec	16omt	Meat products nec
4v_f	Vegetables, fruit, nuts	17vol	Vegetable oils and fats
5osd	Oil seeds	18mil	Dairy products
6c_b	Sugar cane, sugar beet	19pcr	Processed rice
7pfb	Plant-based fibers	20sgr	Sugar
8ocr	Crops nec	21ofd	Food products nec
9ctl	Cattle,sheep,goats,horses	22b_t	Beverages and tobacco products
10oap	Animal products nec	23Mining	Mining
11rmk	Raw milk	24MNF	Manufacturing sectors
12wol	Wool, silk-worm cocoons	25SRV	Services
13frs	Forestry		

Source: GTAP DB 8.1 (February 2013)

1) EU1	2) EU7	3) EU12	4) EU14	5) EU15	6) EU17	7) EU26	8) EU27
1 KOR	1 KOR	1 KOR	1 KOR	1 KOR	1 KOR	1 KOR	1 KOR
2 EU27	2 EC6	2 BEL	2 BEL	2 BEL	2 BEL	2 BEL	2 BEL
3 CHL	3 DIU	3 FRA	3 FRA	3 FRA	3 FRA	3 FRA	3 FRA
4 EFTA	4 G	4 DEU	4 DEU	4 DEU	4 DEU	4 DEU	4 DEU
5 ASEAN	5 EP	5 ITA	5 ITA	5 ITA	5 ITA	5 ITA	5 ITA
6 IND	6 AFS	6 LUX	6 LUX	6 LUX	6 LUX	6 LUX	6 LUX
7 PER	7 CEEC10	7 NLD	7 NLD	7 NLD	7 NLD	7 NLD	7 NLD
8 USA	8 BR	8 DIU	8 DNK	8 DNK	8 DNK	8 DNK	8 DNK
9 TUR	9 CHL	9 G	9 IRL	9 IRL	9 IRL	9 IRL	9 IRL
10 CHN	10 EFTA	10 EP	10 GBR	10 GBR	10 GBR	10 GBR	10 GBR
11 JPN	11 ASEAN	11 AFS	11 G	11 G	11 G	11 G	11 G
12 AUS	12 IND	12 CEEC10	12 EP	12 PRT	12 PRT	12 PRT	12 PRT
13 NZL	13 PER	13 BR	13 AFS	13 ESP	13 ESP	13 ESP	13 ESP
14 CAN	14 USA	14 CHL	14 CEEC10	14 AFS	14 AUT	14 AUT	14 AUT
15 COL	15 TUR	15 EFTA	15 BR	15 CEEC10	15 FIN	15 FIN	15 FIN
16 GCC	16 CHN	16 ASEAN	16 CHL	16 BR	16 SWE	16 SWE	16 SWE
17 MEX	17 JPN	17 IND	17 EFTA	17 CHL	17 CEEC10	17 CYP	17 CYP
18 ROW	18 AUS	18 PER	18 ASEAN	18 EFTA	18 BR	18 CZE	18 CZE
	19 NZL	19 USA	19 IND	19 ASEAN	19 CHL	19 EST	19 EST
	20 CAN	20 TUR	20 PER	20 IND	20 EFTA	20 HUN	20 HUN
	21 COL	21 CHN	21 USA	21 PER	21 ASEAN	21 LVA	21 LVA
	22 GCC	22 JPN	22 TUR	22 USA	22 IND	22 LTU	22 LTU
	23 MEX	23 AUS	23 CHN	23 TUR	23 PER	23 MLT	23 MLT
	24 ROW	24 NZL	24 JPN	24 CHN	24 USA	24 POL	24 POL
		25 CAN	25 AUS	25 JPN	25 TUR	25 SVK	25 SVK
		26 COL	26 NZL	26 AUS	26 CHN	26 SVN	26 SVN
		27 GCC	27 CAN	27 NZL	27 JPN	27 BR	27 BGR
		28 MEX	28 COL	28 CAN	28 AUS	28 CHL	28 ROU
		29 ROW	29 GCC	29 COL	29 NZL	29 EFTA	29 CHL
			30 MEX	30 GCC	30 CAN	30 ASEAN	30 EFTA
			31 ROW	31 MEX	31 COL	31 IND	31 ASEAN
				32 ROW	32 GCC	32 PER	32 IND
					33 MEX	33 USA	33 PER
					34 ROW	34 TUR	34 USA
						35 CHN	35 TUR
						36 JPN	36 CHN
						37 AUS	37 JPN
						38 NZL	38 AUS
						39 CAN	39 NZL
						40 COL	40 CAN
						41 GCC	41 COL
						42 MEX	42 GCC
						43 ROW	43 MEX
							44 ROW

Regions in GTAP model

1) EU1	2) EU7	3) EU12	4) EU14	5) EU15	6) EU17	7) EU26	8) EU27
1 KOR	1 KOR	1 KOR	1 KOR	1 KOR	1 KOR	1 KOR	1 KOR
2 EU27	2 EC6	2 BEL	2 BEL	2 BEL	2 BEL	2 BEL	2 BEL
3 CHL	3 DIU	3 FRA	3 FRA	3 FRA	3 FRA	3 FRA	3 FRA
4 EFTA	4 G	4 DEU	4 DEU	4 DEU	4 DEU	4 DEU	4 DEU
5 ASEAN	5 EP	5 ITA	5 ITA	5 ITA	5 ITA	5 ITA	5 ITA
6 IND	6 AFS	6 LUX	6 LUX	6 LUX	6 LUX	6 LUX	6 LUX
7 PER	7 CEEC10	7 NLD	7 NLD	7 NLD	7 NLD	7 NLD	7 NLD
8 USA	8 BR	8 DIU	8 DNK	8 DNK	8 DNK	8 DNK	8 DNK
9 TUR	9 CHL	9 G	9 IRL	9 IRL	9 IRL	9 IRL	9 IRL
10 CHN	10 EFTA	10 EP	10 GBR	10 GBR	10 GBR	10 GBR	10 GBR
11 JPN	11 ASEAN	11 AFS	11 G	11 G	11 G	11 G	11 G
12 AUS	12 IND	12 CEEC10	12 EP	12 PRT	12 PRT	12 PRT	12 PRT
13 NZL	13 PER	13 BR	13 AFS	13 ESP	13 ESP	13 ESP	13 ESP
14 CAN	14 USA	14 CHL	14 CEEC10	14 AFS	14 AUT	14 AUT	14 AUT
15 COL	15 TUR	15 EFTA	15 BR	15 CEEC10	15 FIN	15 FIN	15 FIN
16 GCC	16 CHN	16 ASEAN	16 CHL	16 BR	16 SWE	16 SWE	16 SWE
17 MEX	17 JPN	17 IND	17 EFTA	17 CHL	17 CEEC10	17 CYP	17 CYP
18 ROW	18 AUS	18 PER	18 ASEAN	18 EFTA	18 BR	18 CZE	18 CZE
	19 NZL	19 USA	19 IND	19 ASEAN	19 CHL	19 EST	19 EST
	20 CAN	20 TUR	20 PER	20 IND	20 EFTA	20 HUN	20 HUN
	21 COL	21 CHN	21 USA	21 PER	21 ASEAN	21 LVA	21 LVA
	22 GCC	22 JPN	22 TUR	22 USA	22 IND	22 LTU	22 LTU
	23 MEX	23 AUS	23 CHN	23 TUR	23 PER	23 MLT	23 MLT
	24 ROW	24 NZL	24 JPN	24 CHN	24 USA	24 POL	24 POL
		25 CAN	25 AUS	25 JPN	25 TUR	25 SVK	25 SVK
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		27 GCC	27 CAN	27 NZL	27 JPN	27 BR	27 BGR
		28 MEX	28 COL	28 CAN	28 AUS	28 CHL	28 ROU
		29 ROW	29 GCC	29 COL	29 NZL	29 EFTA	29 CHL
			30 MEX	30 GCC	30 CAN	30 ASEAN	30 EFTA
			31 ROW	31 MEX	31 COL	31 IND	31 ASEAN
				32 ROW	32 GCC	32 PER	32 IND
					33 MEX	33 USA	33 PER
					34 ROW	34 TUR	34 USA
						35 CHN	35 TUR
						36 JPN	36 CHN
						37 AUS	37 JPN
						38 NZL	38 AUS
						39 CAN	39 NZL
						40 COL	40 CAN
						41 GCC	41 COL
						42 MEX	42 GCC
						43 ROW	43 MEX
							44 ROW

8 Scenarios



FTAs of Korea

FTAs in effect	Concluded FTAs	Under negotiation	Under consideration
K-Chile FTA: 1 Apr. 2004 K-Singapore FTA: 2 Mar. 2006 K-EFTA FTA: 1 Sep. 2006 K-ASEAN FTA: Ag. in goods: 1 Jun. 2007 Ag. in services: 1 Jun. 2009 Ag. in investment: 1 Sep. 2009 K-India CEPA: 1 Jan. 2010 K-EU FTA: 1 July 2011 K-Peru FTA: 1 Aug. 2011 K-U.S. FTA: 15 Mar. 2012 K-Turkey FTA: 1 May 2013	K-Colombia FTA: 31 Aug. 2012 (signed)	K-Canada FTA K-Mexico FTA K-GCC FTA K-Australia FTA K-New Zealand FTA K-China FTA	K-Japan FTA K-C-J FTA K-MERCOSUR FTA K-Russia FTA K-Israel FTA K-SACU FTA K-Vietnam FTA K-Mongolia FTA K-Indonesia FTA K-Malaysia FTA K-Central America FTA

- ❑ GCC: Gulf Cooperation Council or Cooperation Council for the Arab States of the Gulf consisting of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates
- ❑ MERCOSUR: *Mercado Común del Sur (Southern Common Market)* consisting of Argentina, Brazil, Paraguay and Uruguay (Bolivia, Chile, Ecuador and Peru: associate members)
- ❑ SACU: South African Customs Union consisting of South Africa, Botswana, Lesotho, Swaziland and Namibia
- ❑ Central America: Panama, Costa Rica, Guatemala, Honduras, Dominica and El Salvador



Scenarios using GTAP model

- Baseline scenarios:
 - 9 FTAs of Korea which are effective were considered.
 - FTAs of the EU, not considered
- 8 Policy scenarios: 100% cut of tariffs on 22 imported commodities except for rice of Korea (paddy and processed)

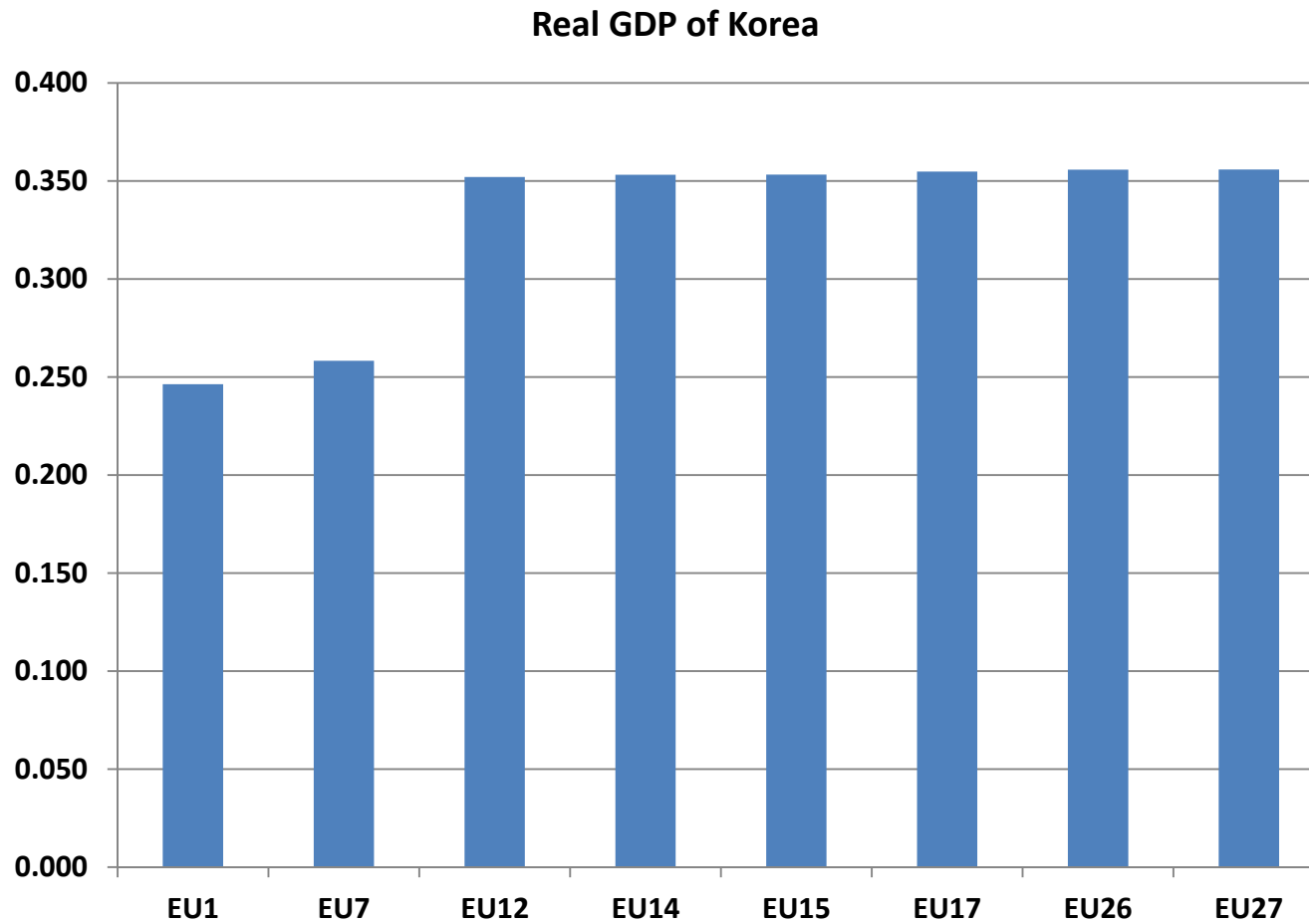


Comparison of simulation results of EU-Korea FTA using GTAP model and CAPRI model



Simulation results using GTAP model

Impact on Real GDP of Korea (% change)



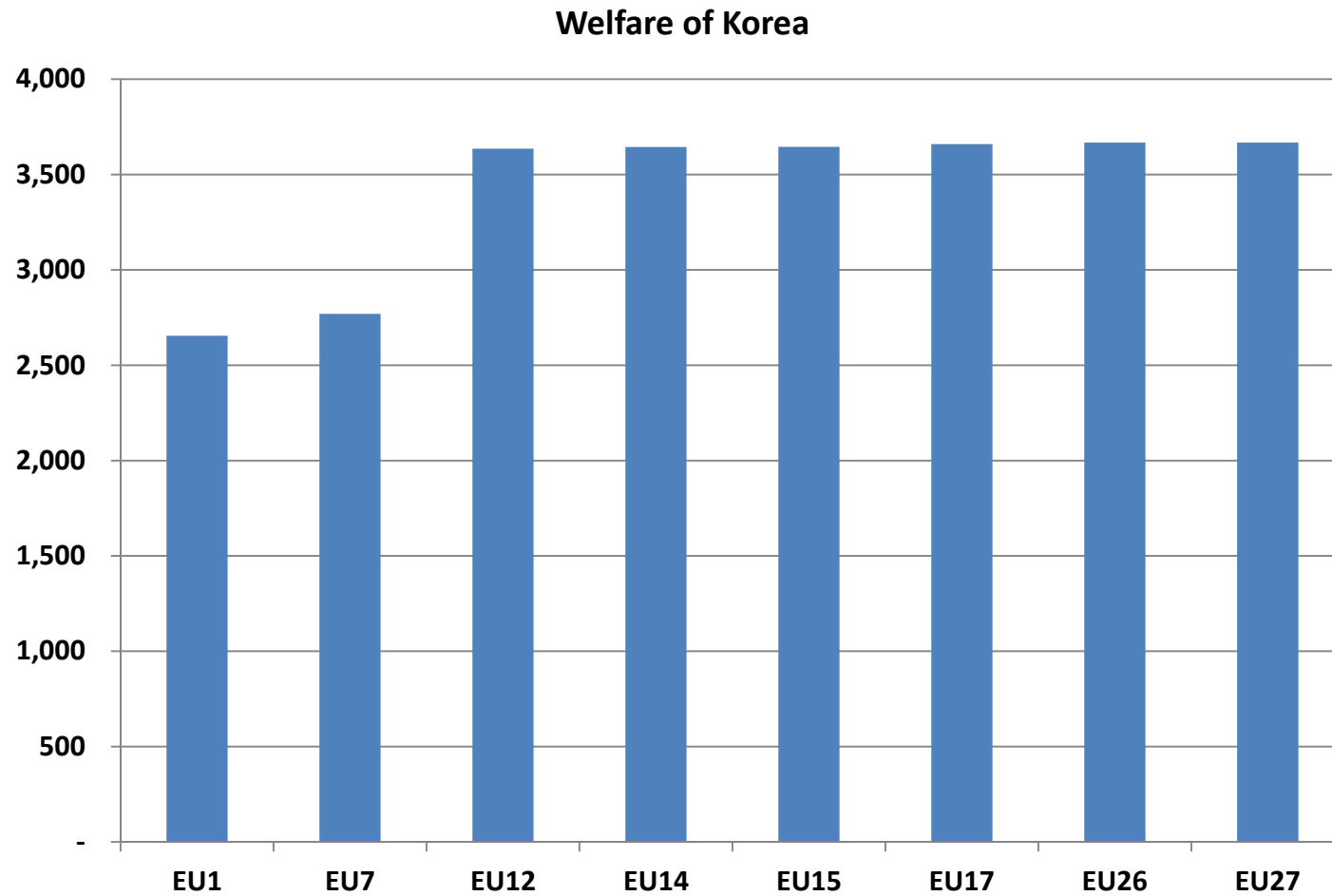


Impact on Real GDP of Korea (% change)

real GDP of Korea

EU1	0.2464
EU7	0.2583
EU12	0.3521
EU14	0.3532
EU15	0.3533
EU17	0.3548
EU26	0.3558
EU27	0.3559

Impact on Welfare of Korea (US\$ million)



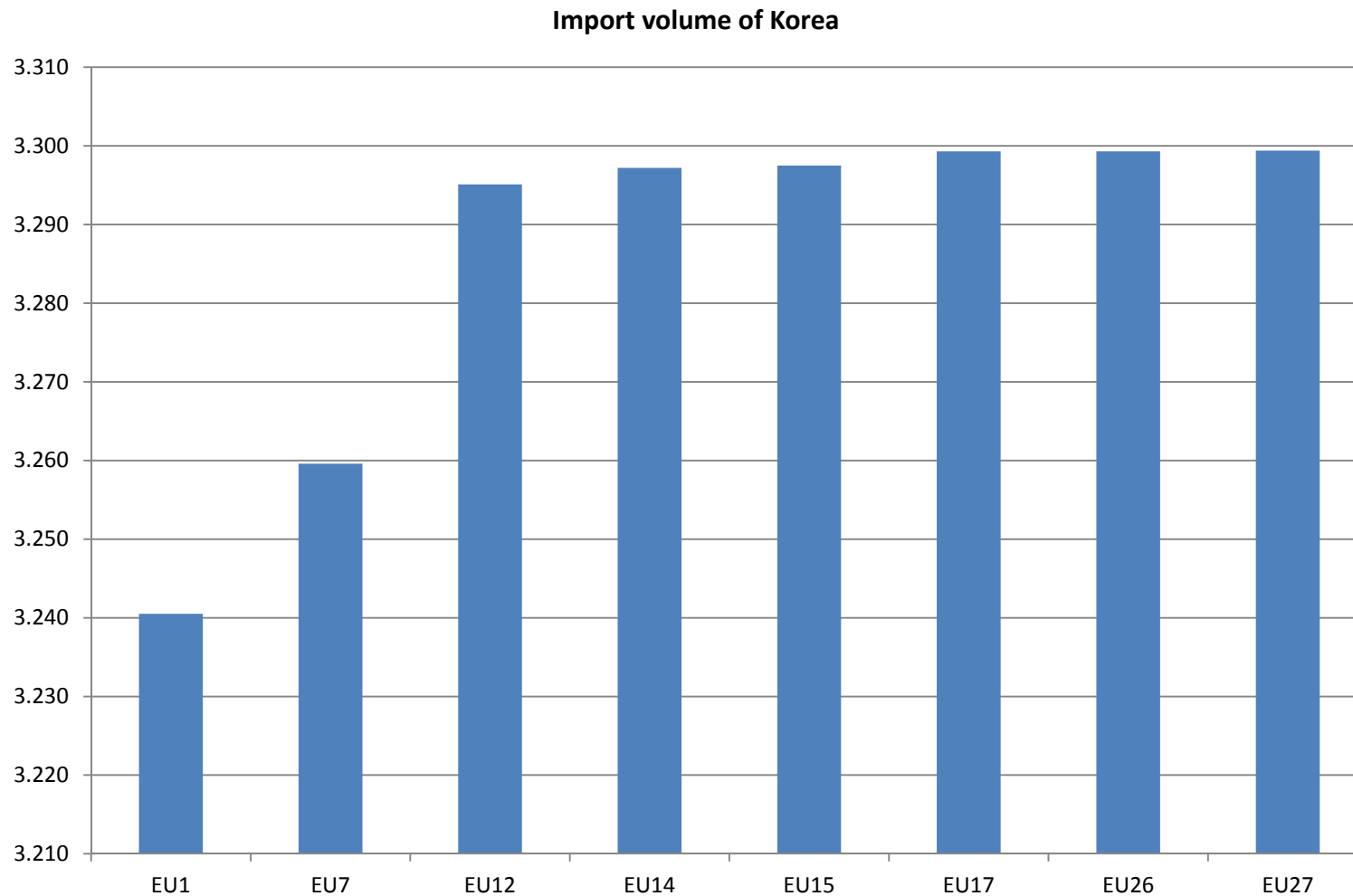


Impact on Welfare of Korea (US\$ million)

Welfare of Korea

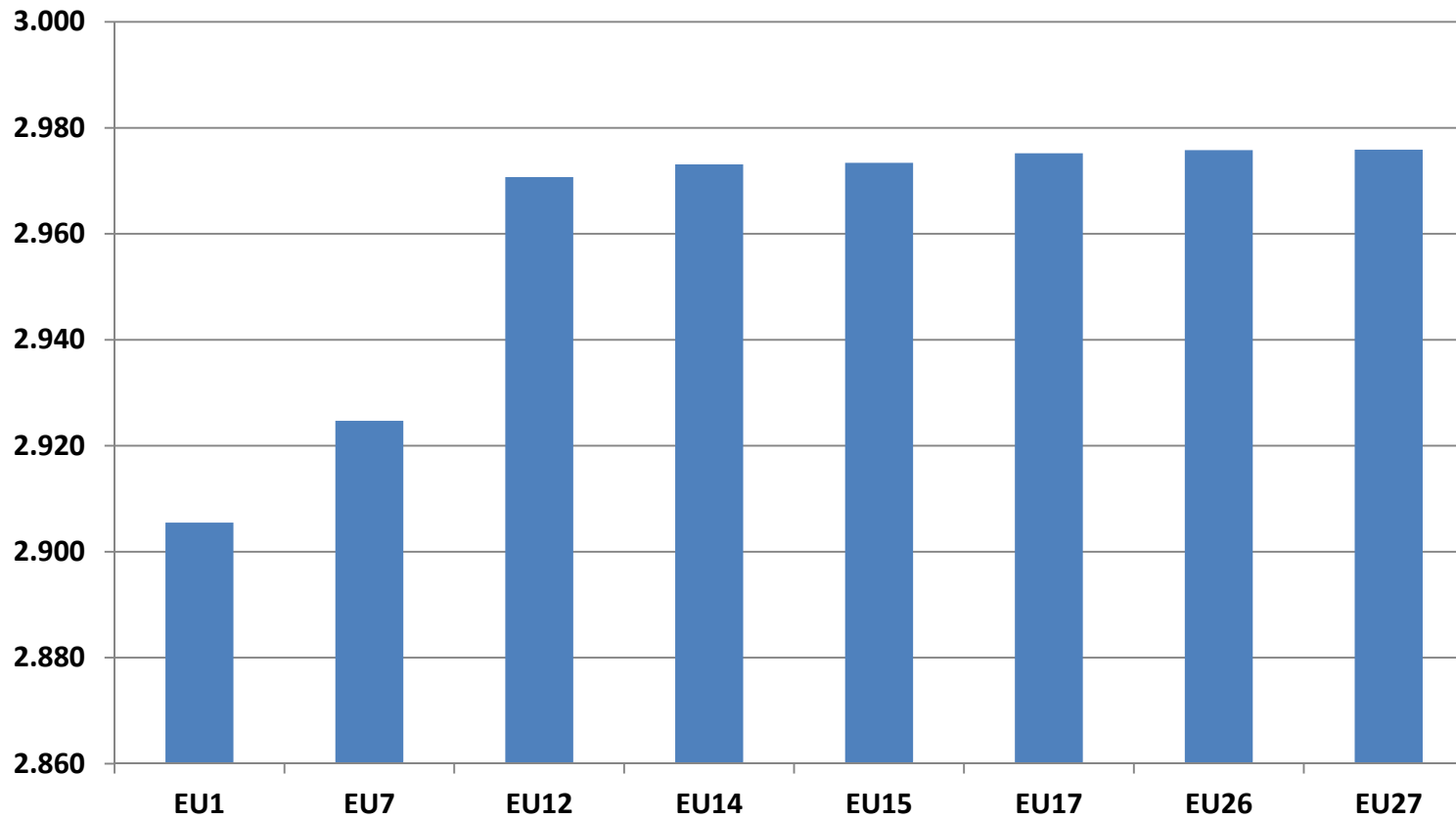
EU1	2,655
EU7	2,769
EU12	3,636
EU14	3,644
EU15	3,645
EU17	3,660
EU26	3,667
EU27	3,668

Impact on Total Imports of Korea (% change)

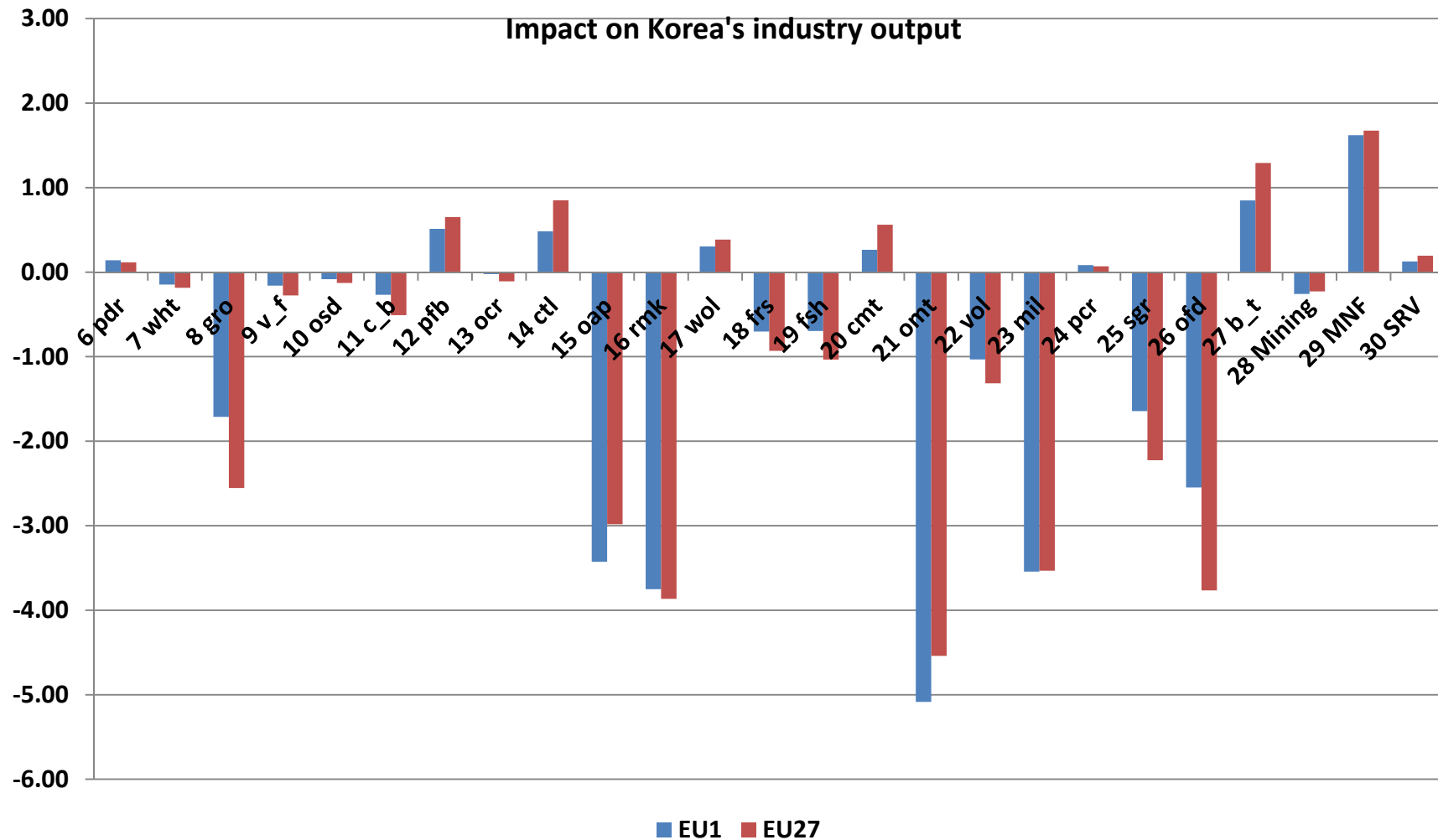


Impact on Total Exports of Korea (% change)

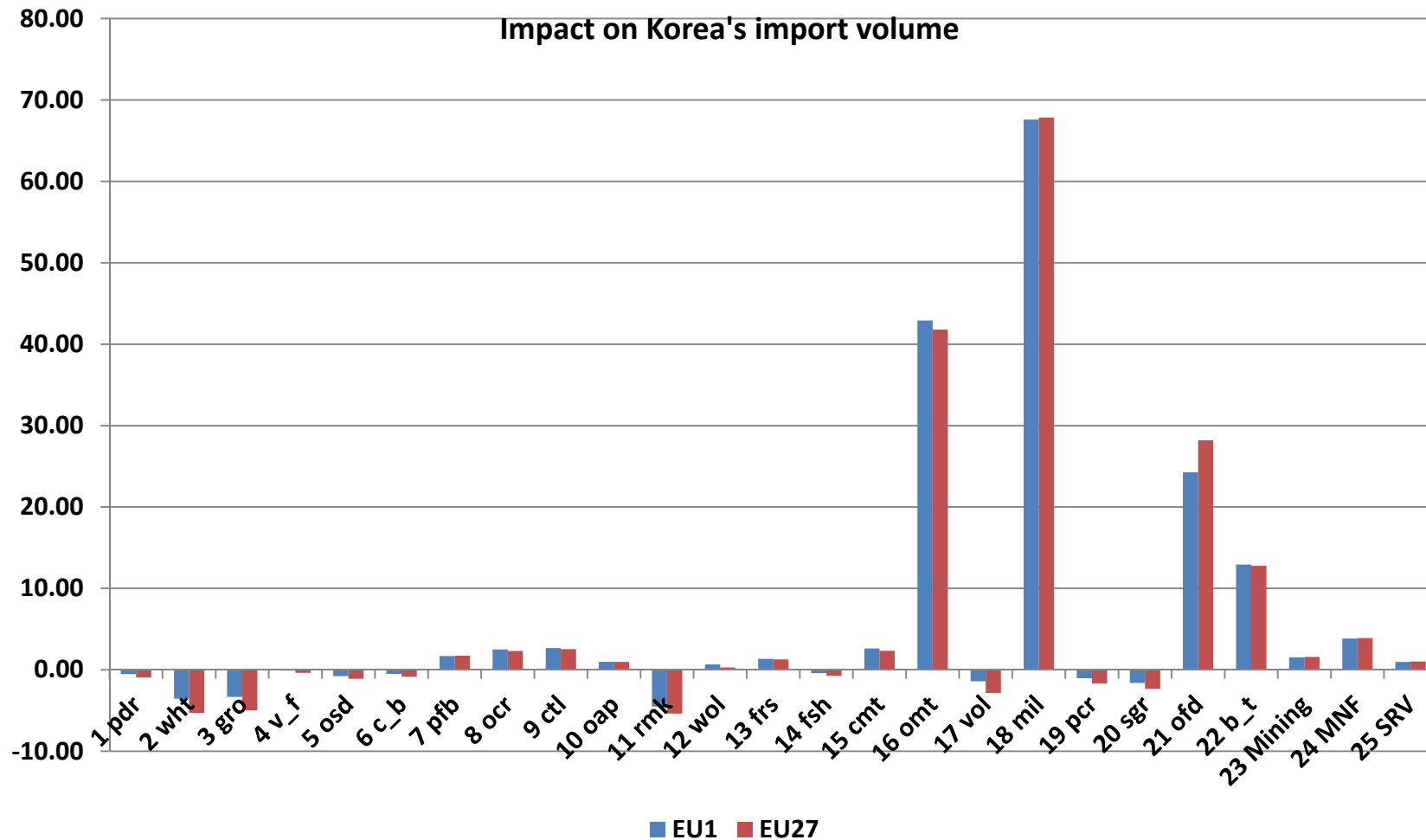
Export volume of Korea



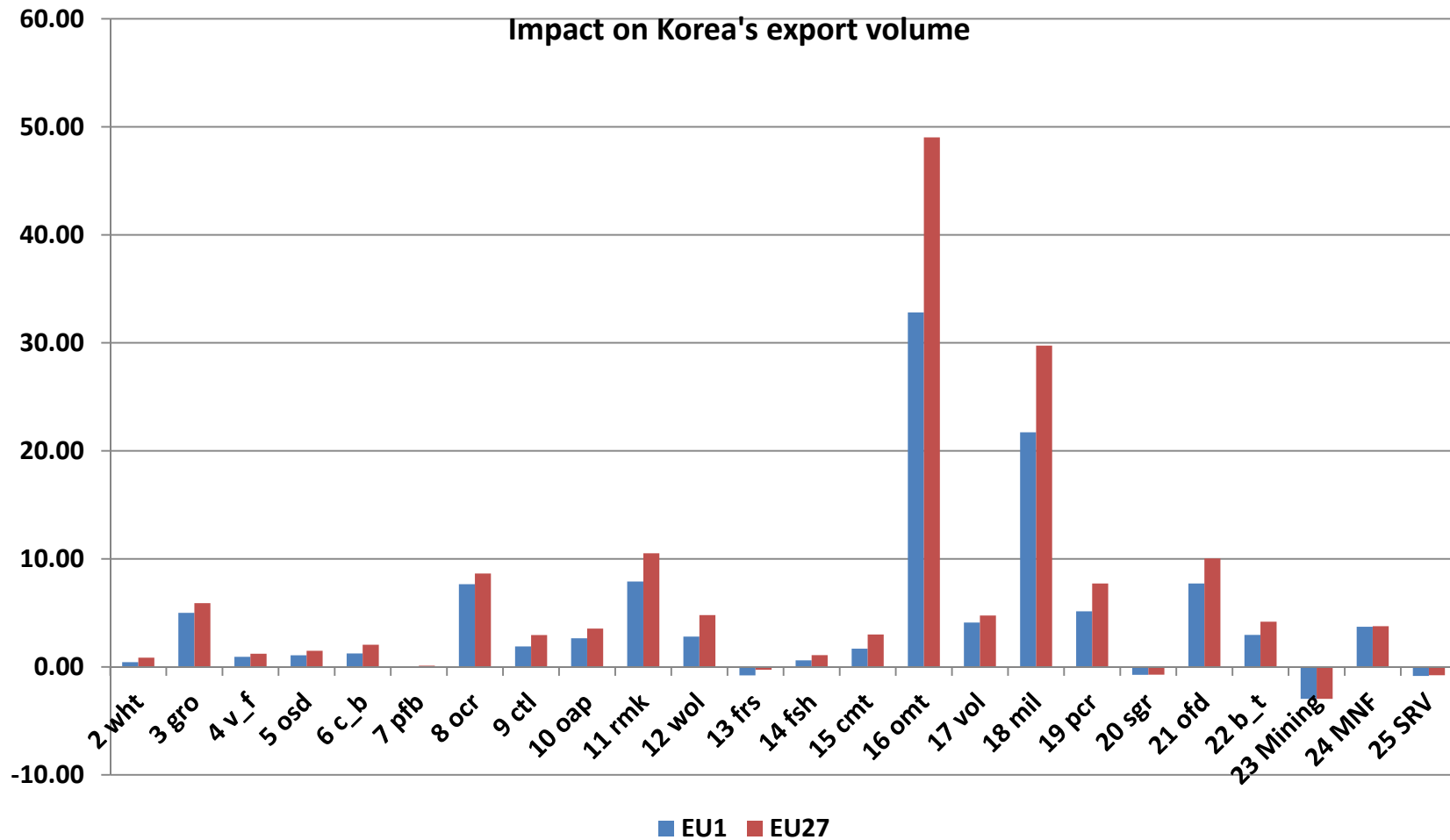
Impact on Industry Output of Korea (% change)



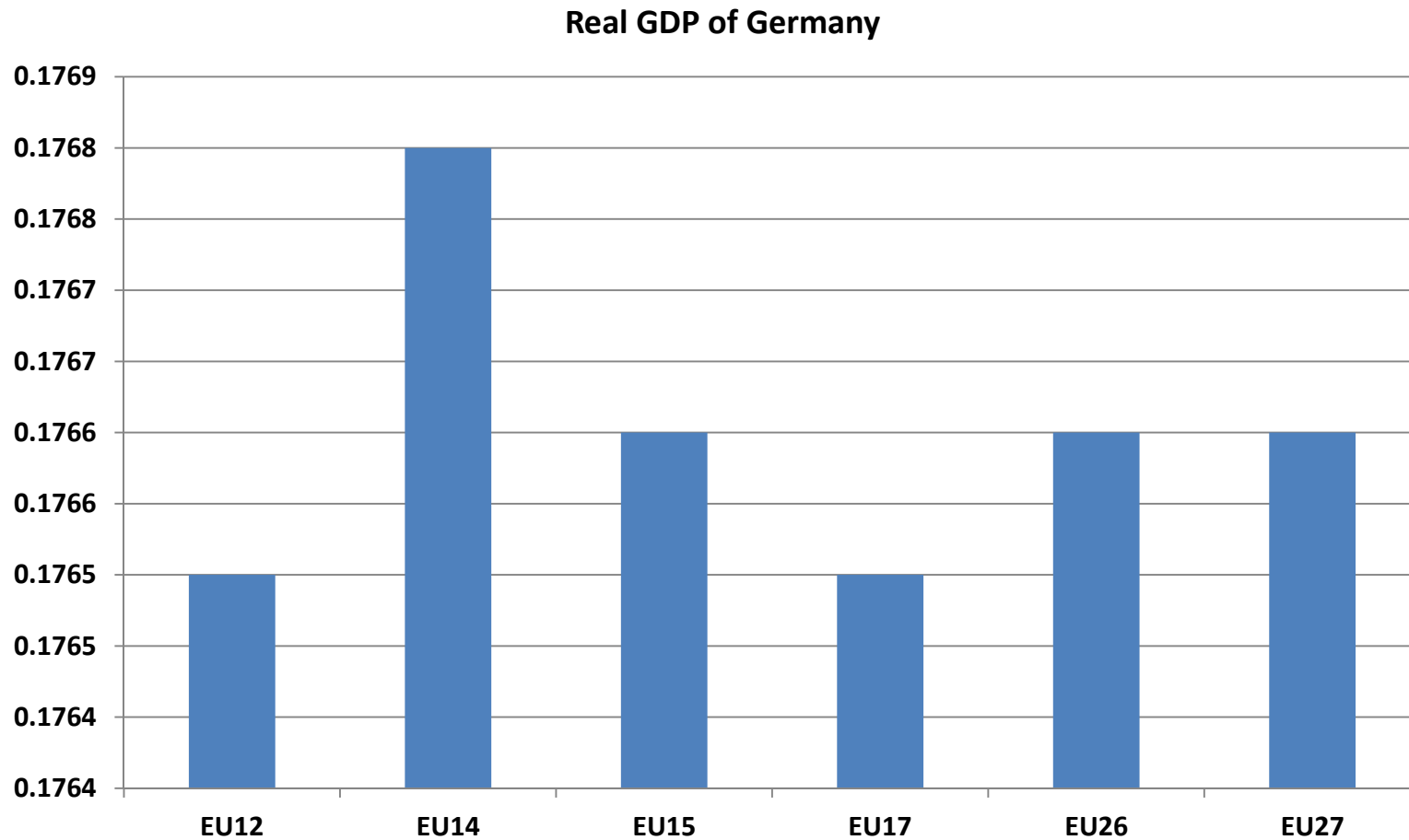
Impact on Import Volume by Sector of Korea (% change)



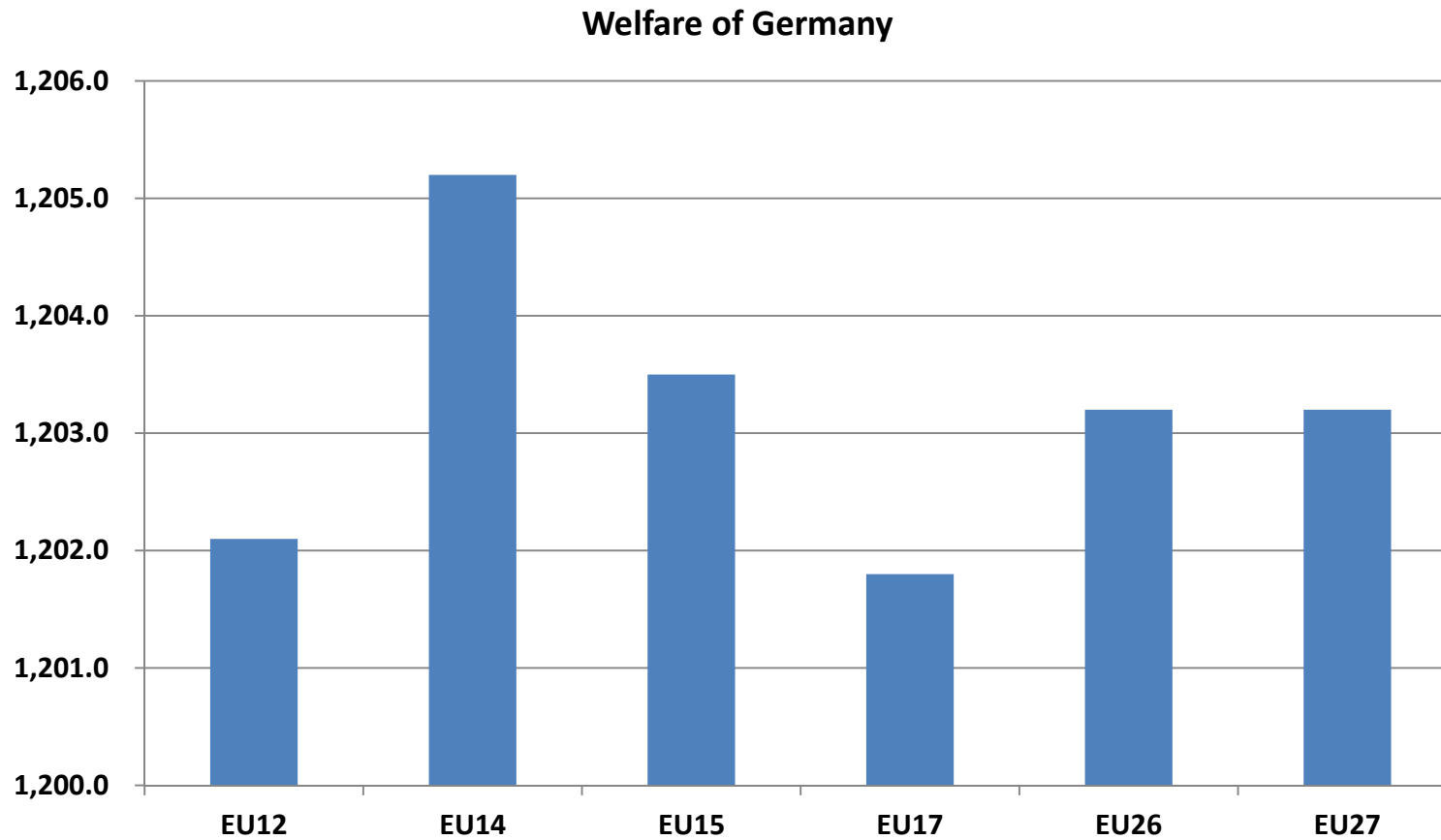
Impact on Export Volume by Sector of Korea (% change)



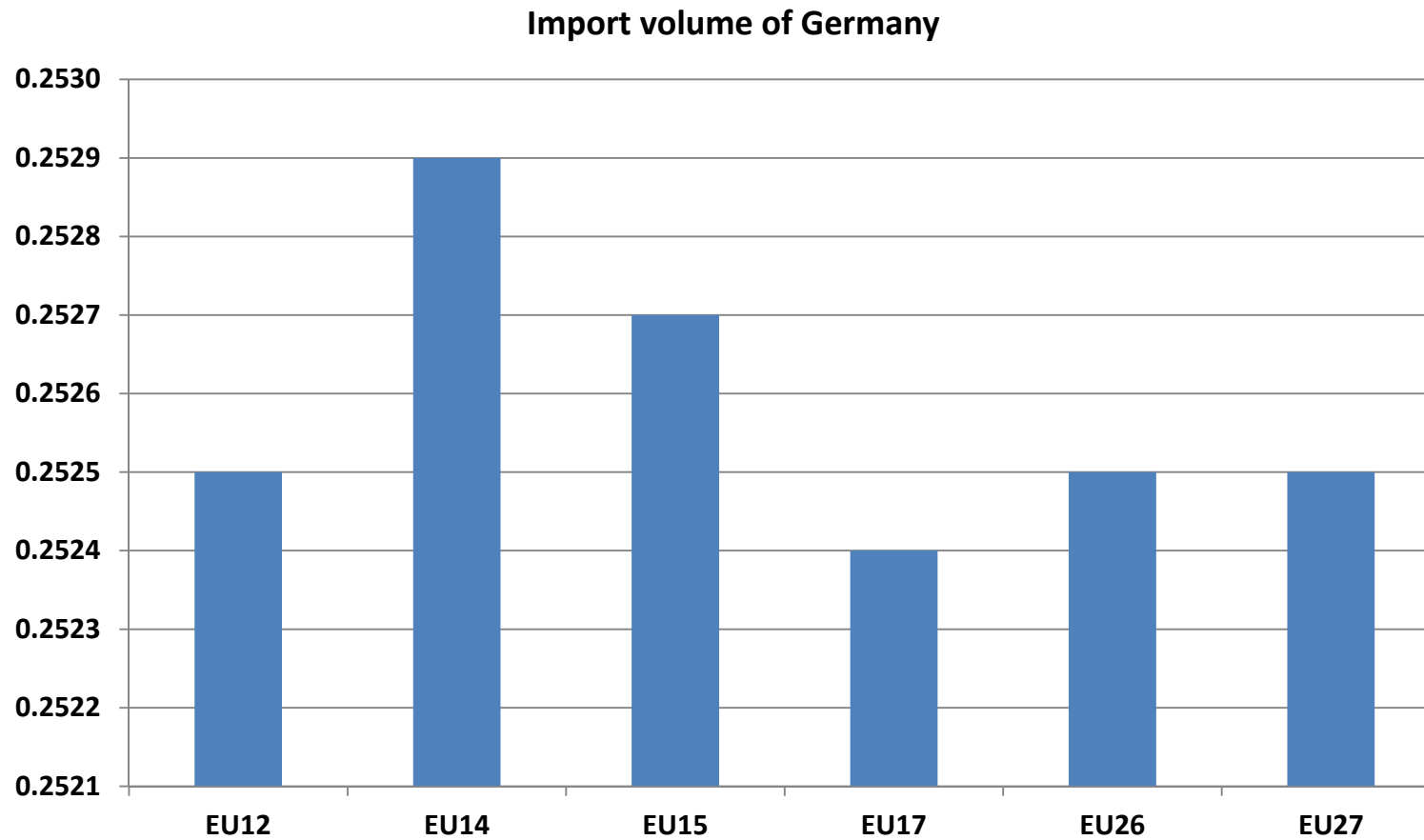
Impact on Real GDP of Germany (% change)



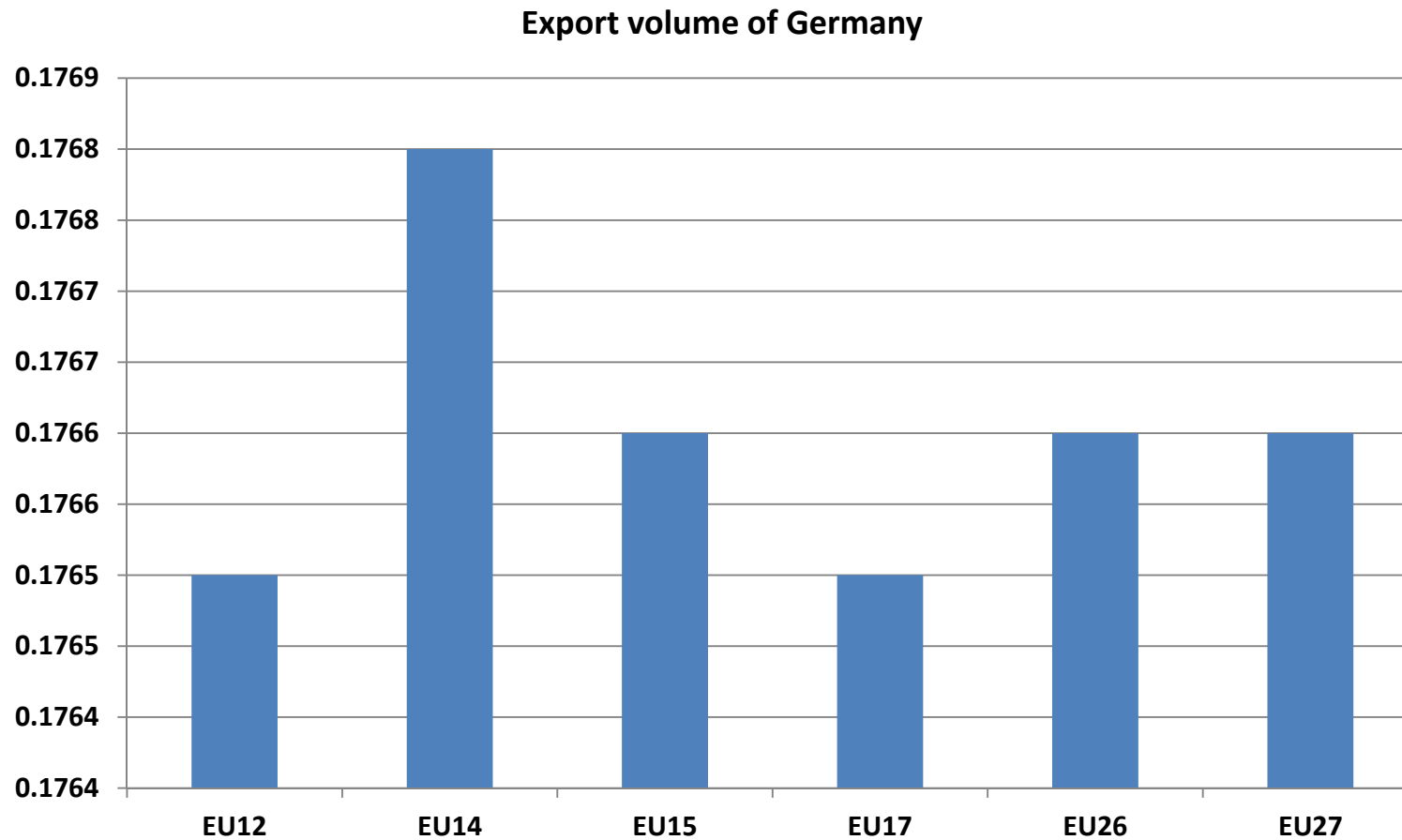
Impact on Welfare of Germany (US\$ million)



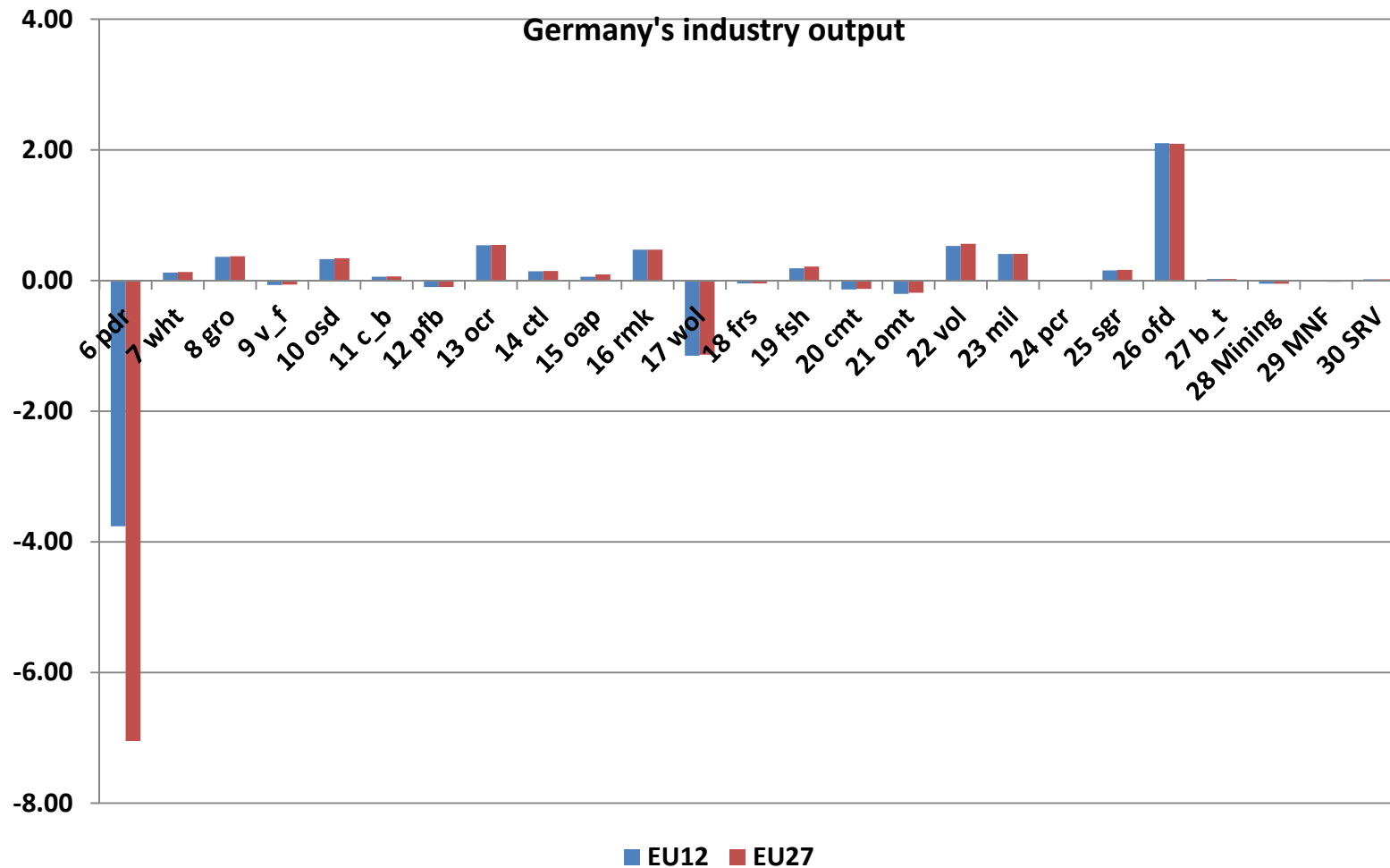
Impact on Total Imports of Germany (% change)



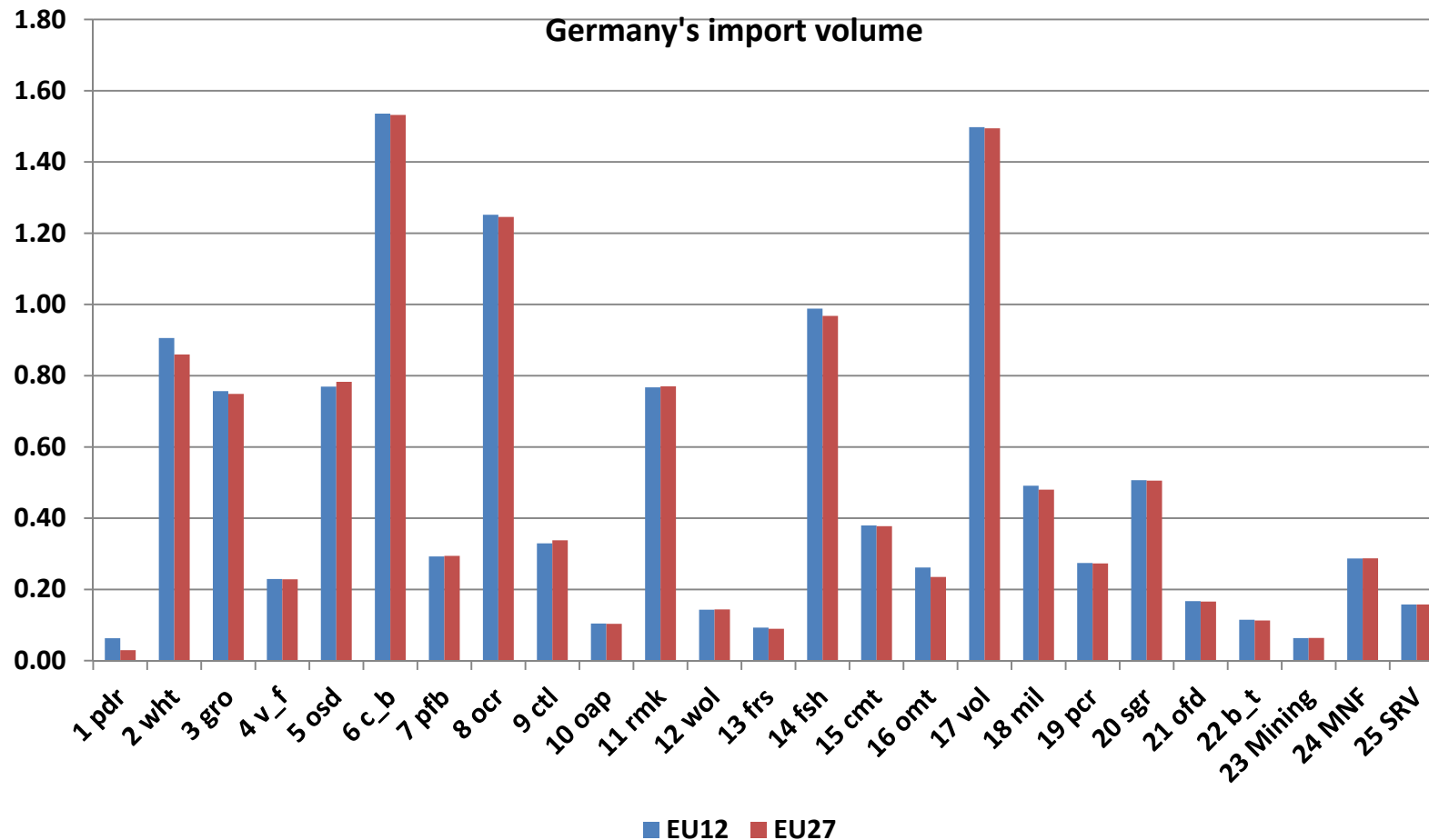
Impact on Total Exports of Germany (% change)



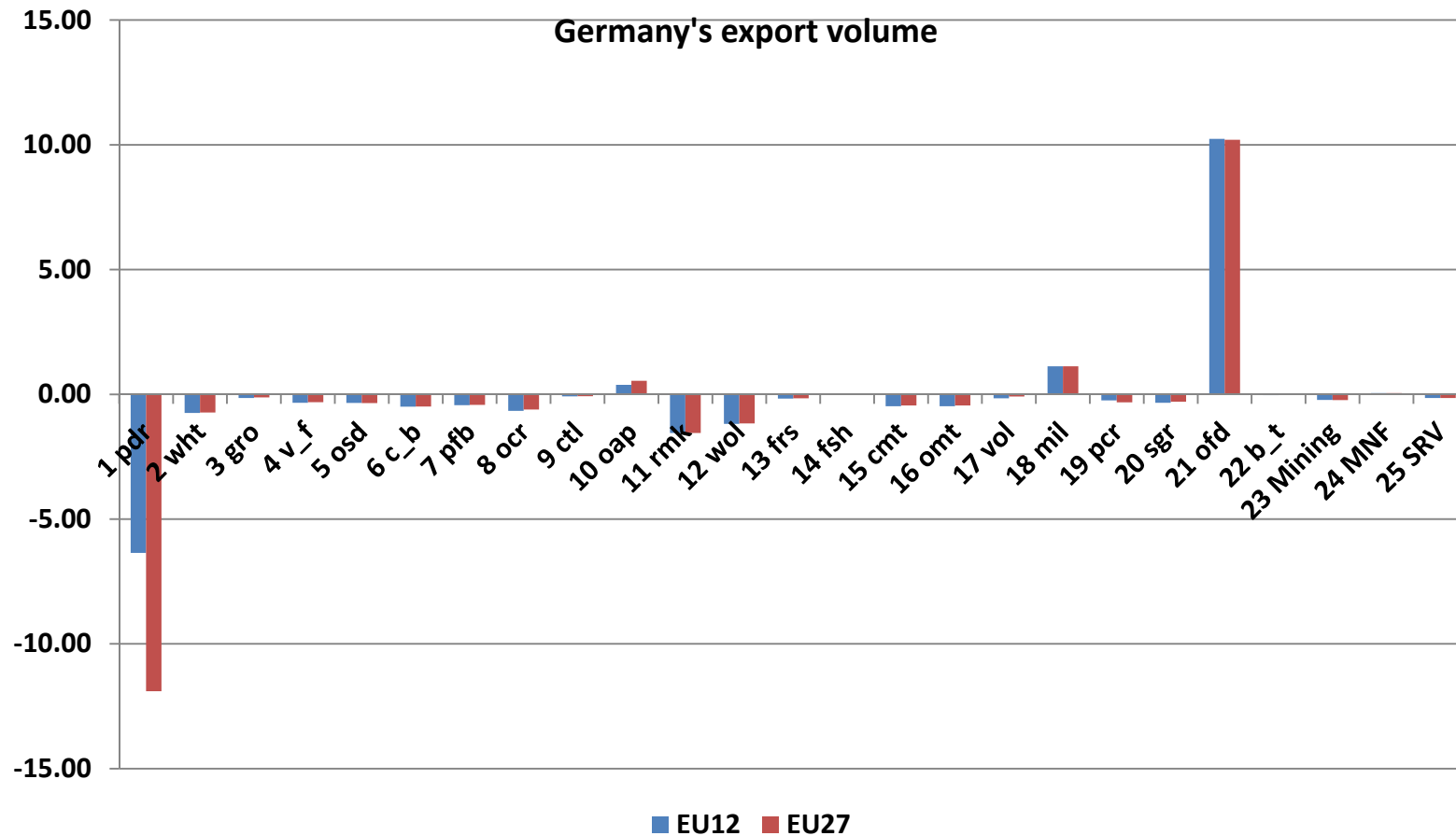
Impact on Industry Output of Germany (% change)



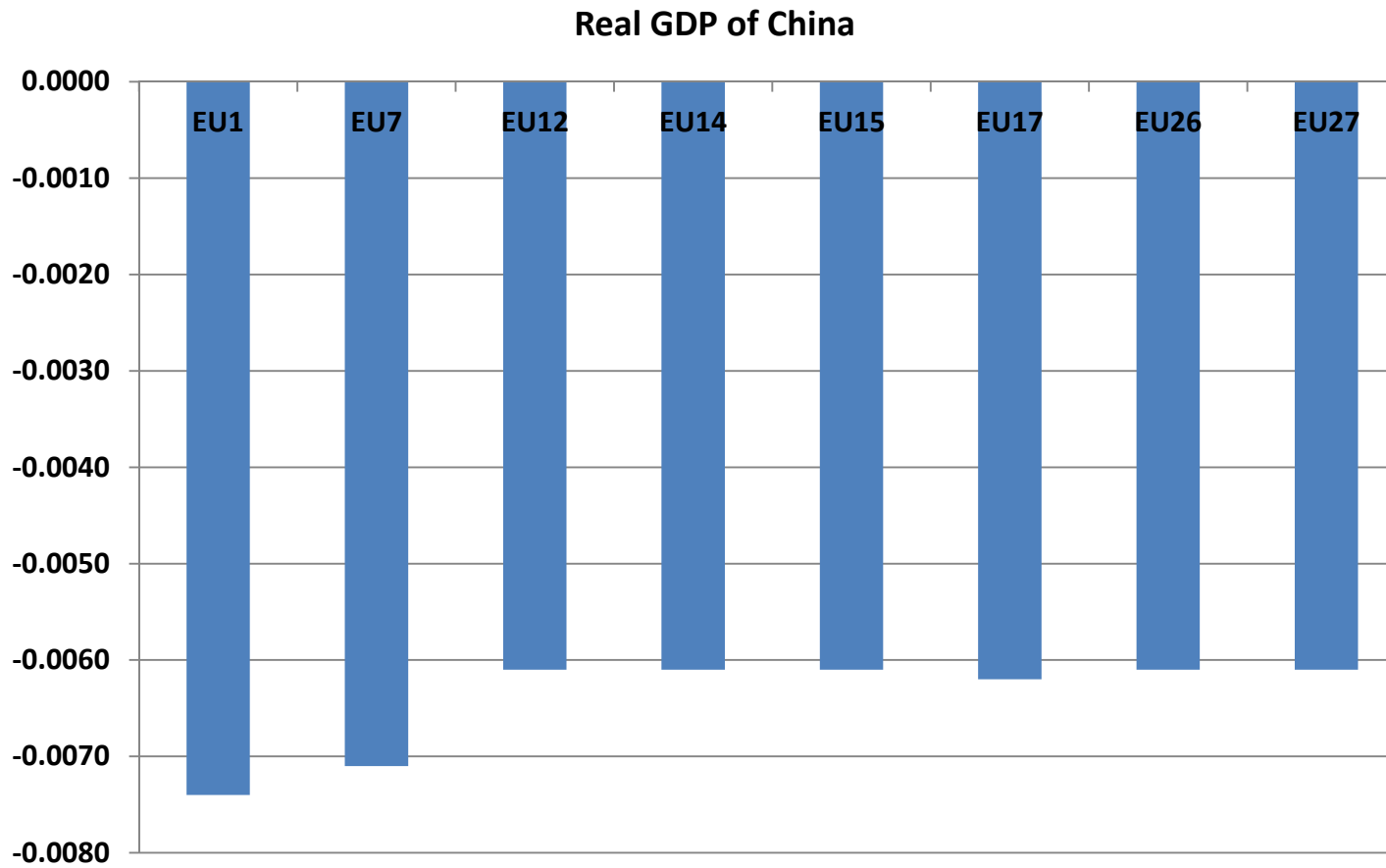
Impact on Import Volume by Sector of Germany (% change)



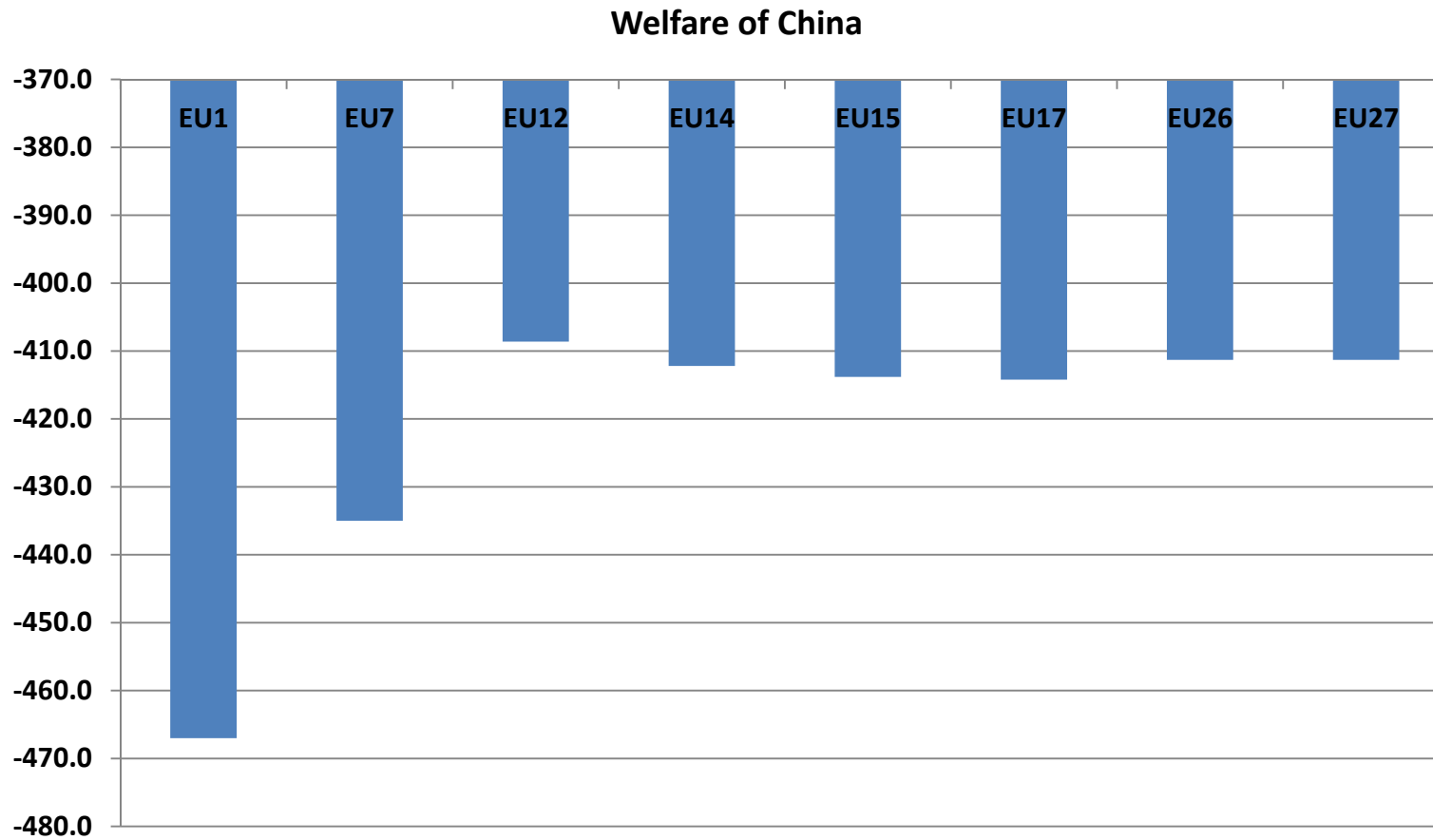
Impact on Export Volume by Sector of Germany (% change)



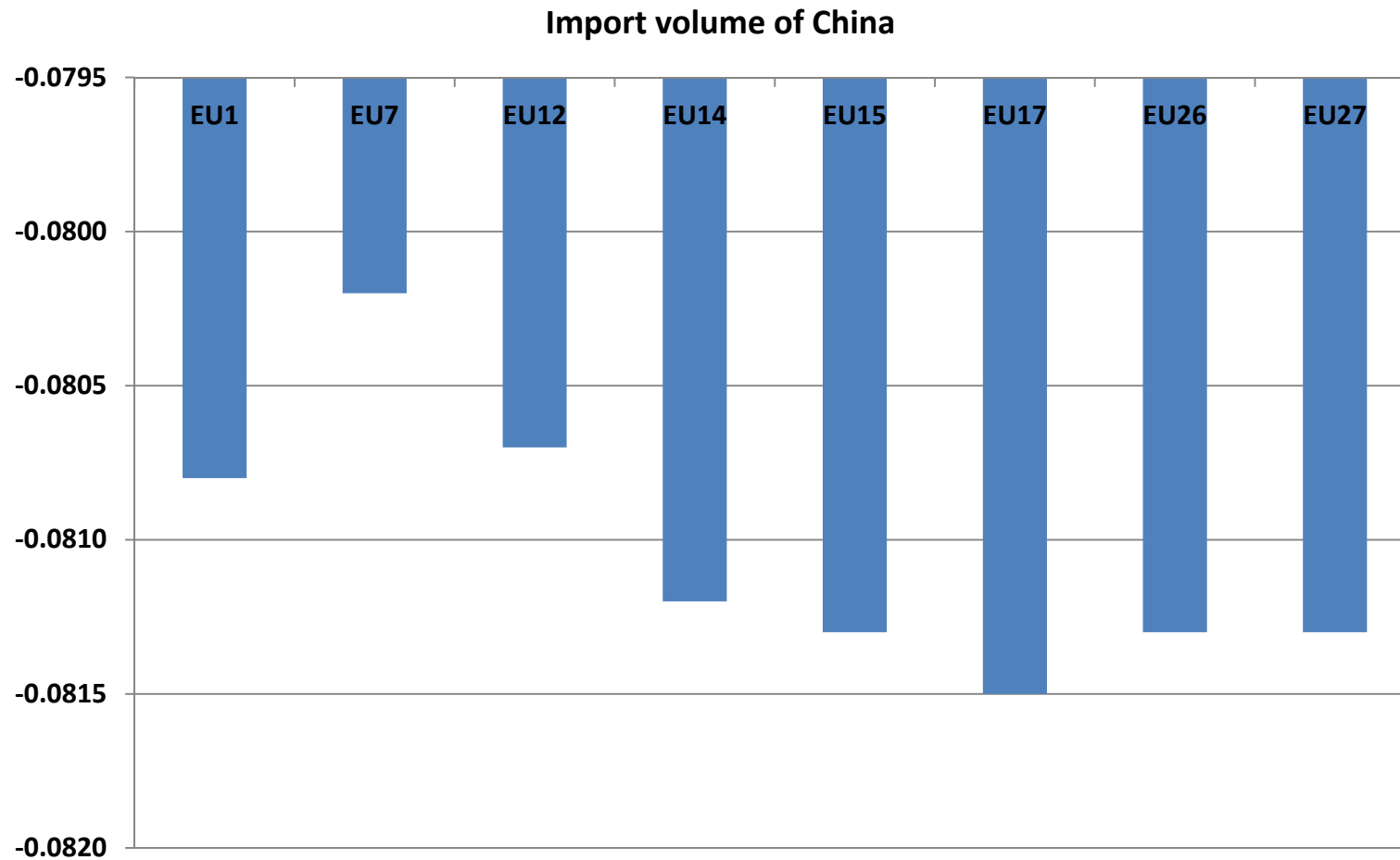
Impact on Real GDP of China (% change)



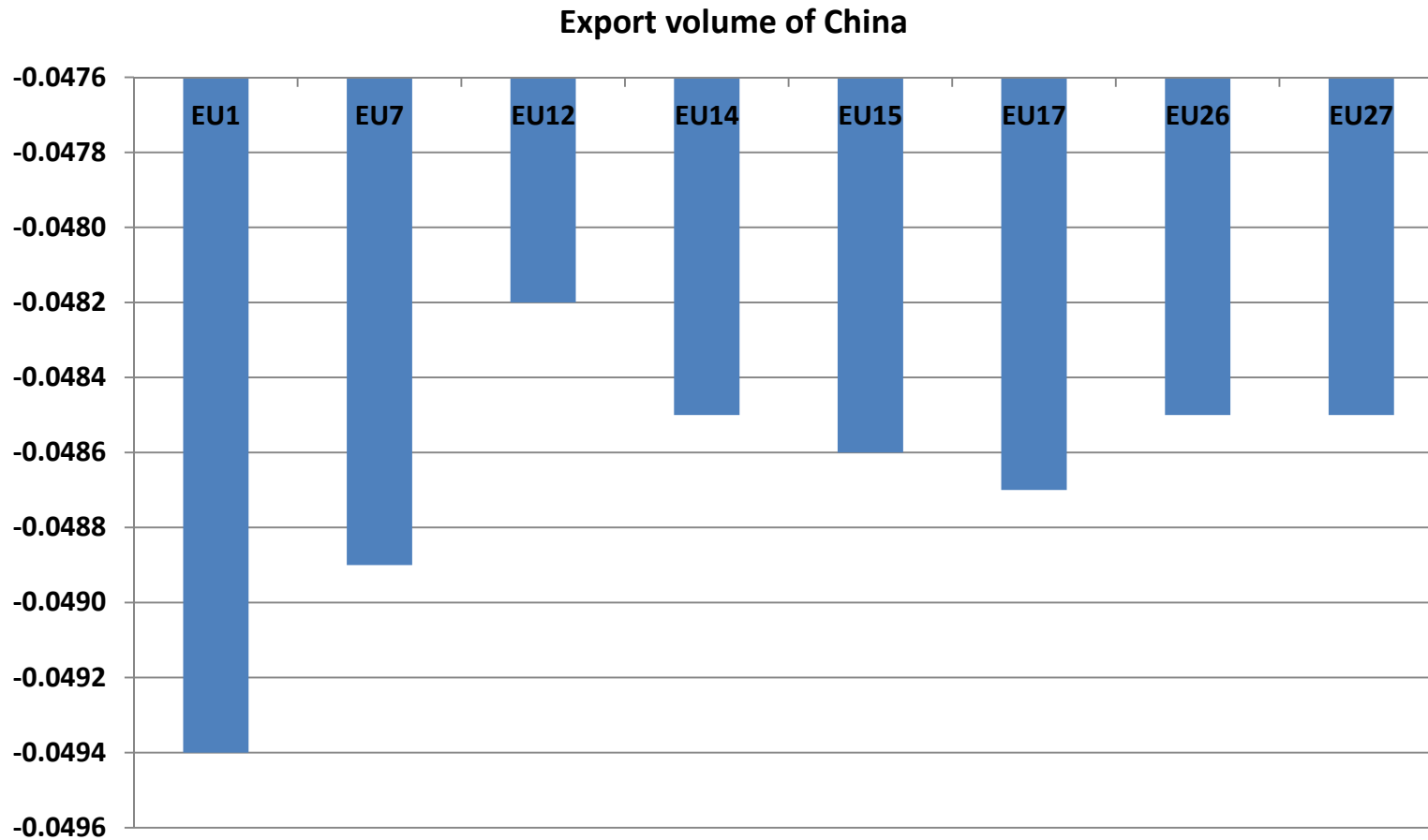
Impact on Welfare of China (US\$ million)



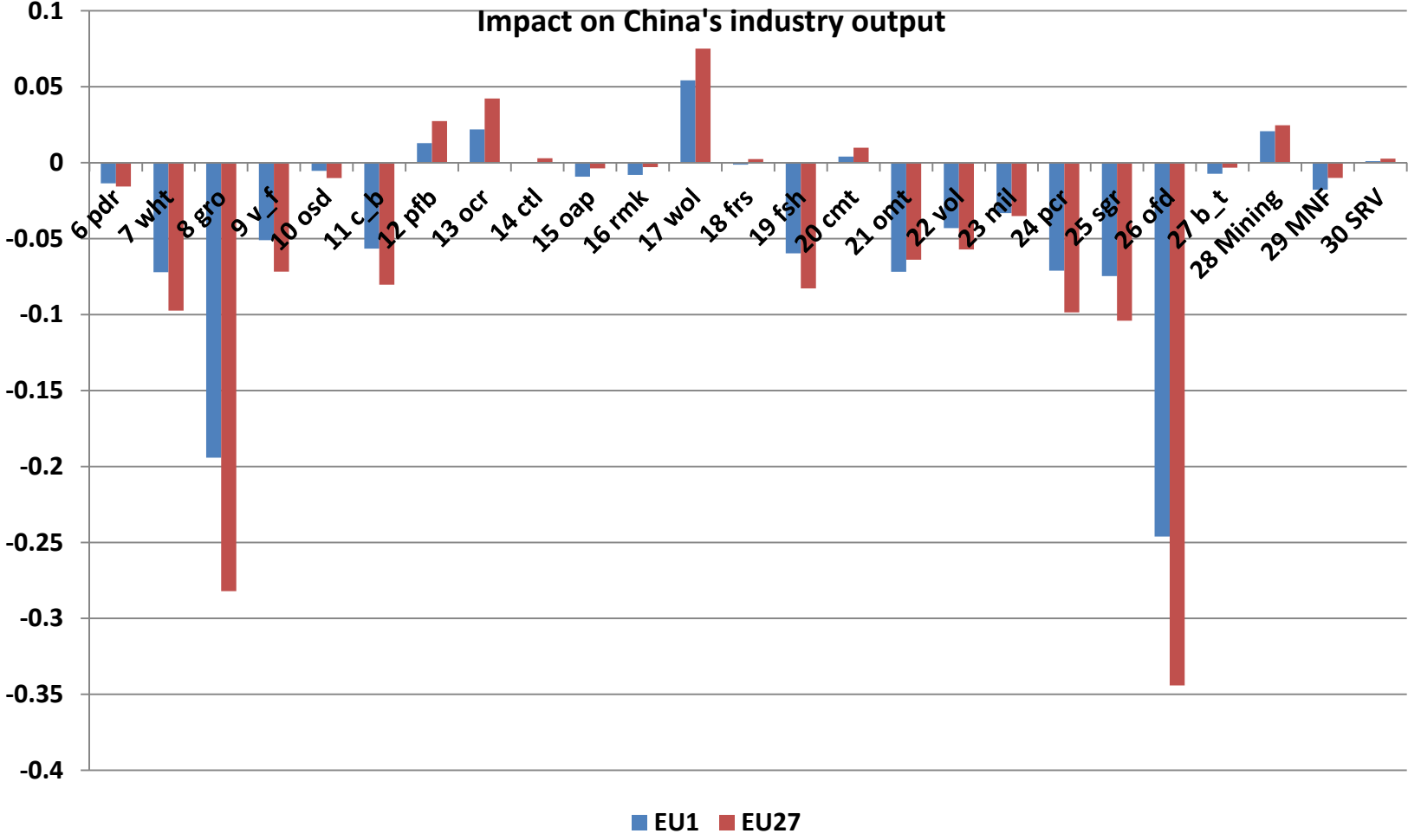
Impact on Total Imports of China (% change)



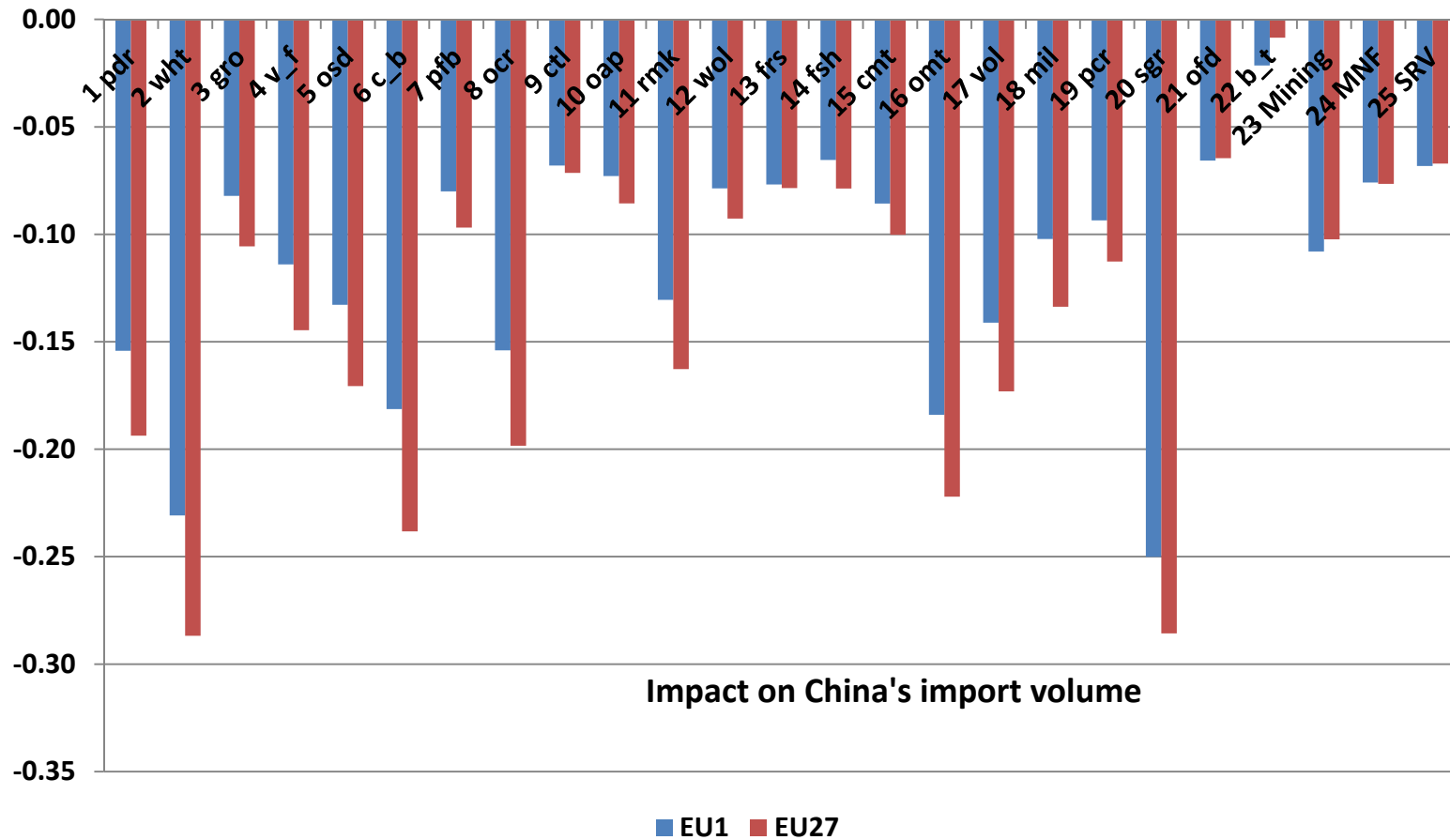
Impact on Total Exports of China (% change)



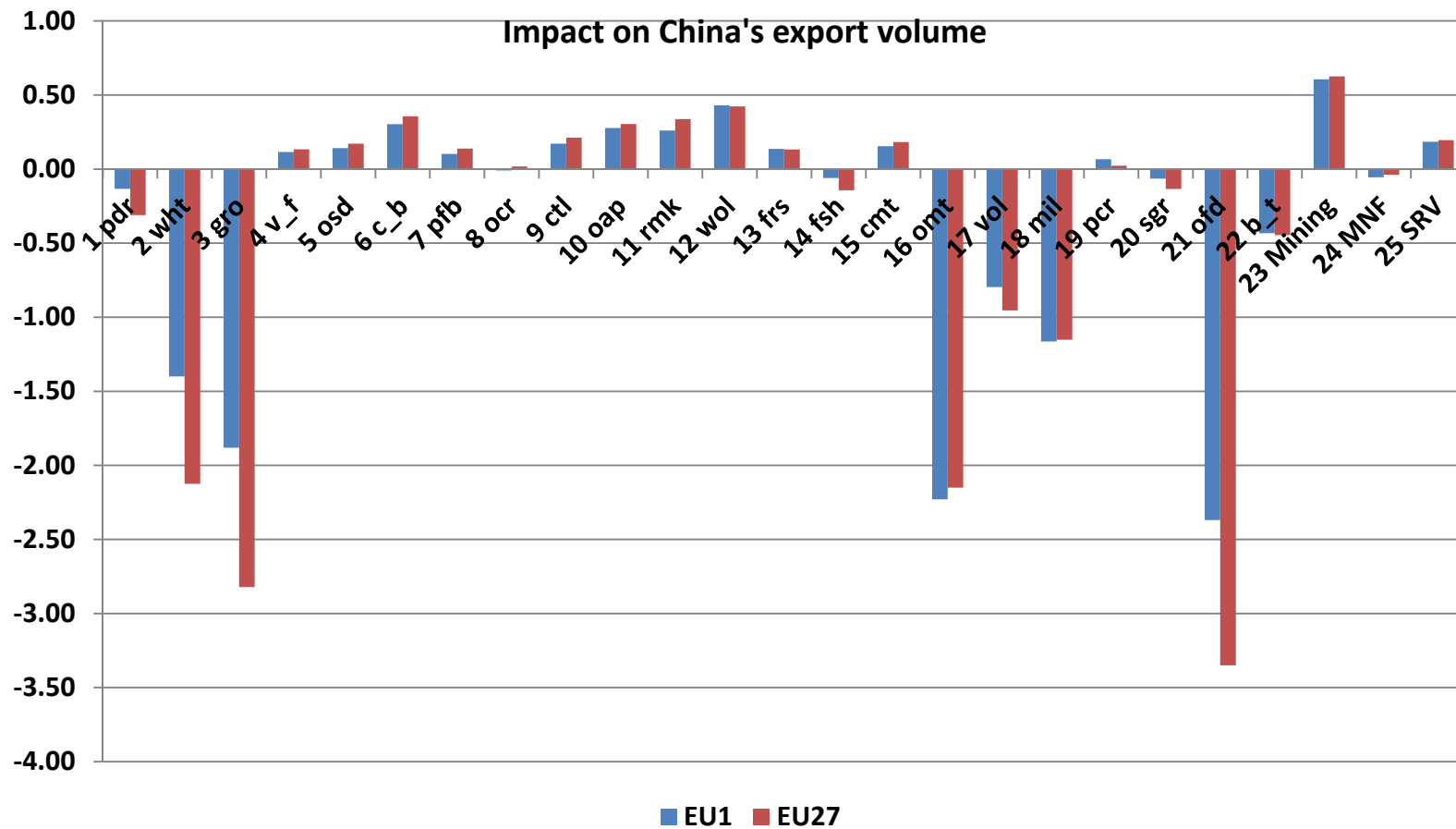
Impact on Industry Output of China (% change)



Impact on Import Volume by Sector of China (% change)



Impact on Export Volume by Sector of China (% change)





Conclusions

- ❑ Regional disaggregation matters to Korea.
- ❑ Korea's sectoral impacts of regional disaggregation can be larger, depending protection level.
- ❑ Therefore, regional disaggregation of "EU27", not one region as a whole, should be used for impact analysis of the EU-Korea FTA.



Conclusions

- Impacts of regional aggregation on Germany are negligibly small.
 - Effects of the EU-Korea FTA on all member states of the EU are negligibly small.
 - Its sectoral effects can be “not” negligibly small, depending on protection level.
- Impacts of regional aggregation on China are relatively small, but China’s sectoral impacts are larger than those on Germany’s sectoral ones.
 - Effects of the EU-Korea FTA on all non-members of the EU are relatively small.
 - Its sectoral effects can be “not” relatively small, depending on protection level.



Conclusions

- Many things should be done to achieve the objectives of this study.
 - Results of EU-Korea FTA using CAPRI model
 - Comparison of results between GTAP model and CAPRI model



Thank you for your attention!