Key Assumptions in AGE Trade Models:

An Assessment using the *Mirage* Model

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MIRAGE

- A dynamic CGEM of the world economy divided into regions, aimed at analyzing trade agreements
- Incorporates imperfect competition and foreign direct investments
- Sequential dynamics
- Based on GTAP and MAcMaps databases

3 specific assumptions

- Different qualities of goods
- Imperfect competition
- Foreign Direct Investment

Methodology : we repeat the same simulation for MIRAGE and the 3 alternate models obtained by releasing one of the 3 assumptions

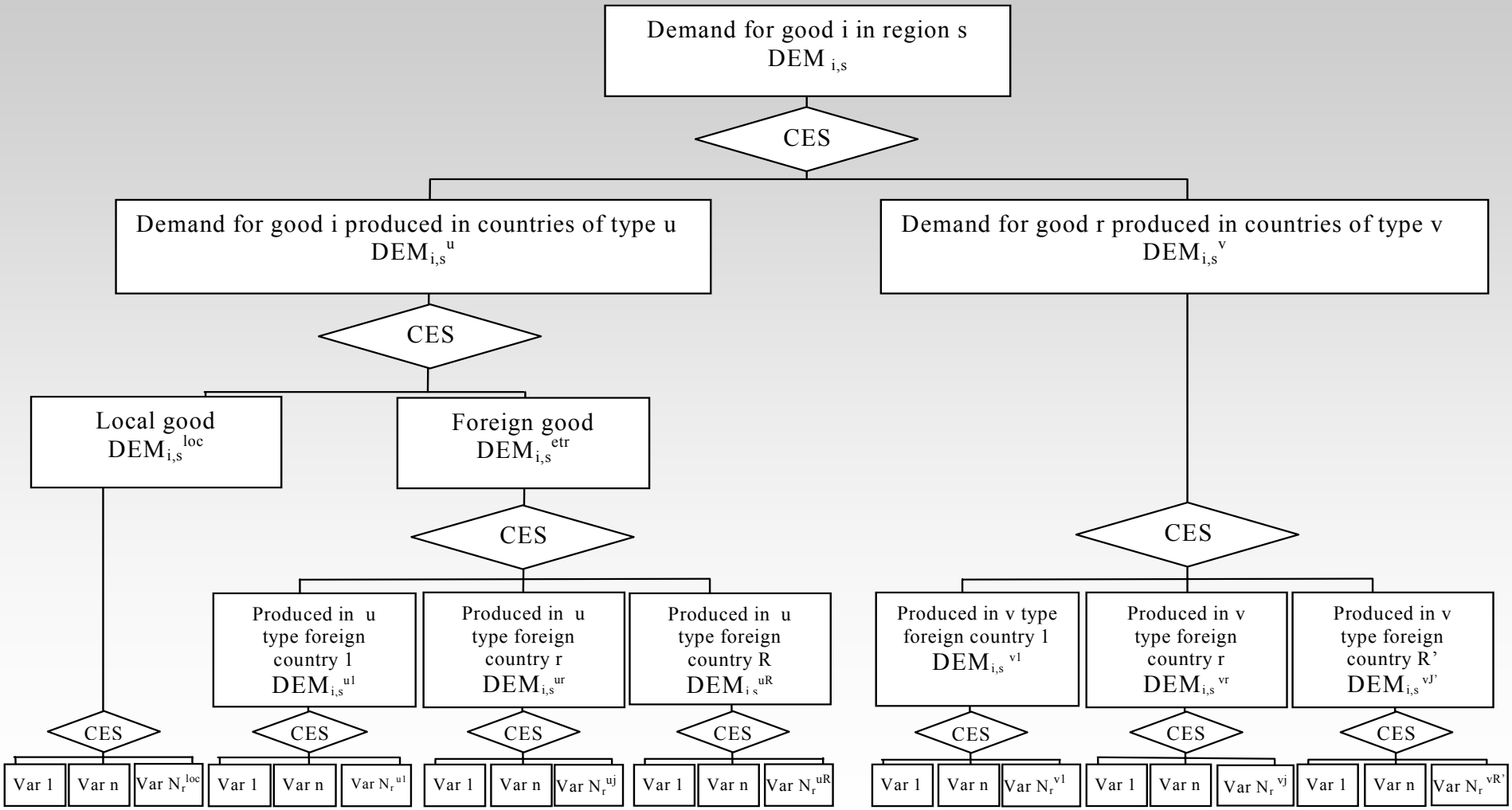
The simulation

- 5 regions : Europe, Periphery, other industrialized countries, developing Asia, other developing countries
- 11 sectors
- Trade agreement : bilateral liberalization of Europe and its periphery in 4 years

Initial level of protection between the EU and its periphery

	Barriers of EUR to PER products	Barriers of PER to EUR products
Food	12.7%	21.4%
Primary	1.5%	4.3%
Chemical	3.3%	5.0%
Clothes	9.6%	8.0%
Equipment	2.7%	4.3%
Manuf	3.4%	7.4%
Vehicles	2.9%	17.0%

Qualities


Demand for good i in region s
DEM i,s
CES
Demand for good i produced in countries of type u
DEM i,s u
Demand for good r produced in countries of type v
DEM i,s v
CES
Local good
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Foreign good
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Produced in u type foreign country 1
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Direct effect on both partners: an increase of all effects on bilateral trade flows

Bilateral trade, by sectors

using the standard version of *Mirage*

	Trade From EU to periphery					Trade from periphery to EU				
	Initial level	t+1	t+3	t+7	t+12	Initial level	t+1	t+3	t+7	t+12
Food	1.83	9.4%	32.3%	47.2%	47.8%	0.88	10.1%	34.2%	47.4%	46.9%
Clothes	1.61	5.8%	18.6%	25.2%	24.9%	2.25	10.0%	36.6%	64.8%	72.1%
Primary	0.80	3.6%	11.1%	15.4%	15.9%	3.92	1.4%	4.2%	5.4%	5.2%
Manuf	1.46	3.6%	11.4%	15.9%	16.2%	1.36	3.6%	11.3%	15.0%	14.8%
Vehic	1.67	9.3%	31.0%	45.7%	46.6%	0.70	4.6%	13.3%	14.1%	14.2%
Chemical	3.20	2.8%	8.8%	12.6%	13.1%	1.71	4.0%	12.5%	16.5%	16.4%
Equipment	5.01	2.1%	6.4%	9.1%	9.5%	1.58	3.8%	11.5%	15.0%	15.0%
Houses	0.15	-0.8%	-2.0%	-1.7%	-1.4%	0.20	0.3%	0.6%	-0.3%	-0.7%
TrT	0.75	0.1%	0.4%	0.9%	1.1%	1.40	0.0%	-0.1%	-0.7%	-0.9%
EGE	0.12	0.3%	1.0%	2.0%	2.3%	0.15	0.1%	0.1%	-1.0%	-1.3%
AutreSer	1.34	0.2%	0.7%	1.5%	1.8%	1.24	-0.1%	-0.6%	-2.2%	-2.5%

Bilateral trade, by sectors

when not taking into account the lesser substitutability between quality ranges

	Trade From EU to periphery					**Trade from periphery to EU**				
	Niveau initial	**t+1**	**t+3**	**t+7**	**t+12**	Niveau initial	**t+1**	**t+3**	**t+7**	**t+12**
Food	1.83	12.2%	42.6%	62.9%	63.2%	0.88	11.4%	39.4%	55.0%	54.4%
Clothes	1.61	9.4%	30.8%	41.2%	40.6%	2.25	11.8%	43.9%	78.6%	86.9%
Primary	0.80	6.0%	18.6%	25.1%	25.2%	3.92	1.8%	5.9%	8.5%	8.5%
Manuf	1.46	5.3%	16.8%	23.6%	24.2%	1.36	4.7%	14.8%	19.5%	18.9%
Vehic	1.67	10.9%	37.5%	58.5%	61.5%	0.70	7.8%	21.7%	18.3%	17.0%
Chemical	3.20	4.1%	13.1%	18.6%	19.3%	1.71	5.8%	18.5%	24.7%	24.3%
Equipment	5.01	2.5%	7.7%	10.9%	11.6%	1.58	5.1%	15.9%	20.5%	19.9%
Houses	0.15	-1.1%	-3.2%	-3.0%	-2.5%	0.20	1.0%	2.7%	1.7%	1.0%
TrT	0.75	0.1%	0.2%	0.5%	0.7%	1.40	0.3%	0.8%	0.6%	0.3%
EGE	0.12	0.4%	1.2%	2.1%	2.6%	0.15	0.6%	1.7%	1.3%	1.0%
AutreSer	1.34	0.2%	0.5%	1.2%	1.5%	1.24	0.5%	1.5%	0.9%	0.4%

European Imports

		Standard	Alternate
	Initial level	t+12	t+12
Imports from:			
Developing Asia	19,49	-4,8%	-2,9%
Other developing countries	10,31	-2,7%	-1,3%
European periphery	17,74	18,4%	24,4%
Other industrialized countries	48,92	0,9%	-0,2%

European periphery imports

		Standard	Alternate
	Initial level	t+12	t+12
Imports from:			
Developing Asia	2,48	-1,0%	-12,7%
Other developing countries	1,38	-0,1%	-9,8%
Europe	20,69	19,0%	26,4%
Other industrialized countries	6,37	-14,4%	-10,9%

Imperfect competition

- Most sectors are oligopolistic à la Cournot
- Dixit-Stiglitz CES differentiation among varieties
- Variable mark-up computed within the model
- The entry of new firm is partially free:

– zero profit condition in the base year
– A first computation with a fixed number of firms
– A second one with profit reduced by 20 (segmented sectors) or 50% (fragmented sectors). Classification proposed by Sutton, Schmalensee and Oliveira-Martins

Effects on trade flows only in some sectors in the European periphery exports to Europe. For example Clothes for which the increase goes from +60% to +72%, and Vehicles for which it goes from +21% to +16%. Why?

How imperfect competition affects trade impacts?

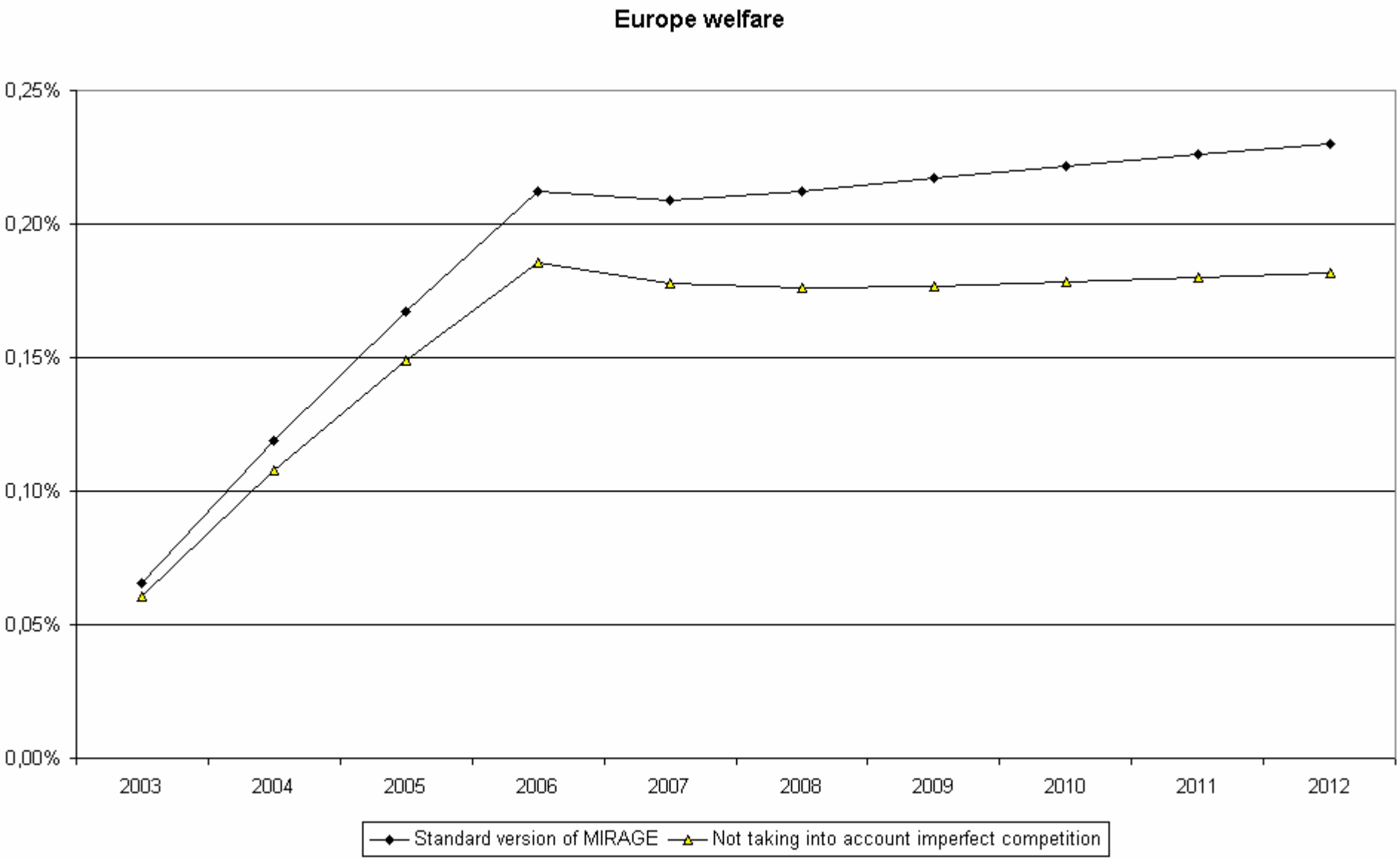
- A trade agreement can make a sector grow or shrink
- The equilibrium size of each variety do not vary much in the long run
- Rise of the number of varieties in the growing sectors
- Since demanders have a preference for variety that increase add a second positive effect on demand
- The second effect is large only if exports account for a significant part of production

What happened in the illustrative simulations?

- European periphery is too small compared to Europe to affect the number of varieties
- The periphery's clothes sector is favored by the agreement
- Even though exports of vehicles increase in the periphery, imports increase more so that the number of varieties shrink in that sector

Effect on welfare

- The change of trade effects are to small to have a big impact on welfare changes
- The number of varieties proposed on each market affects welfare directly
- When production increases (decreases) globally, the number of varieties increases (decreases) as well, so that welfare increases (decreases) more


Europe welfare
0,25%
0,20%
0,15%
0,10%
0,05%
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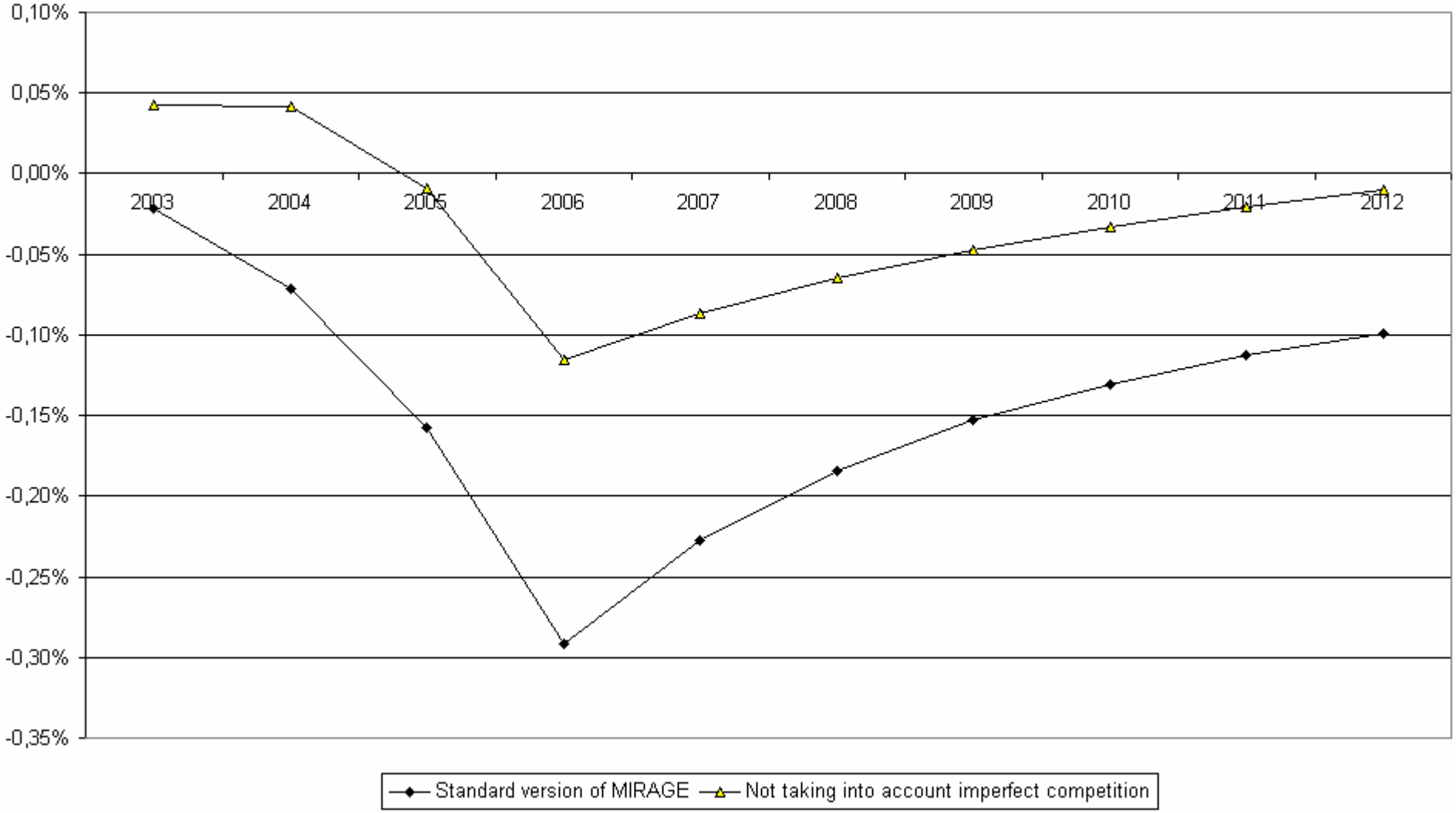
2012
Standard version of MIRAGE
Not taking into account imperfect competition

European Periphery welfare



Foreign Direct Investment

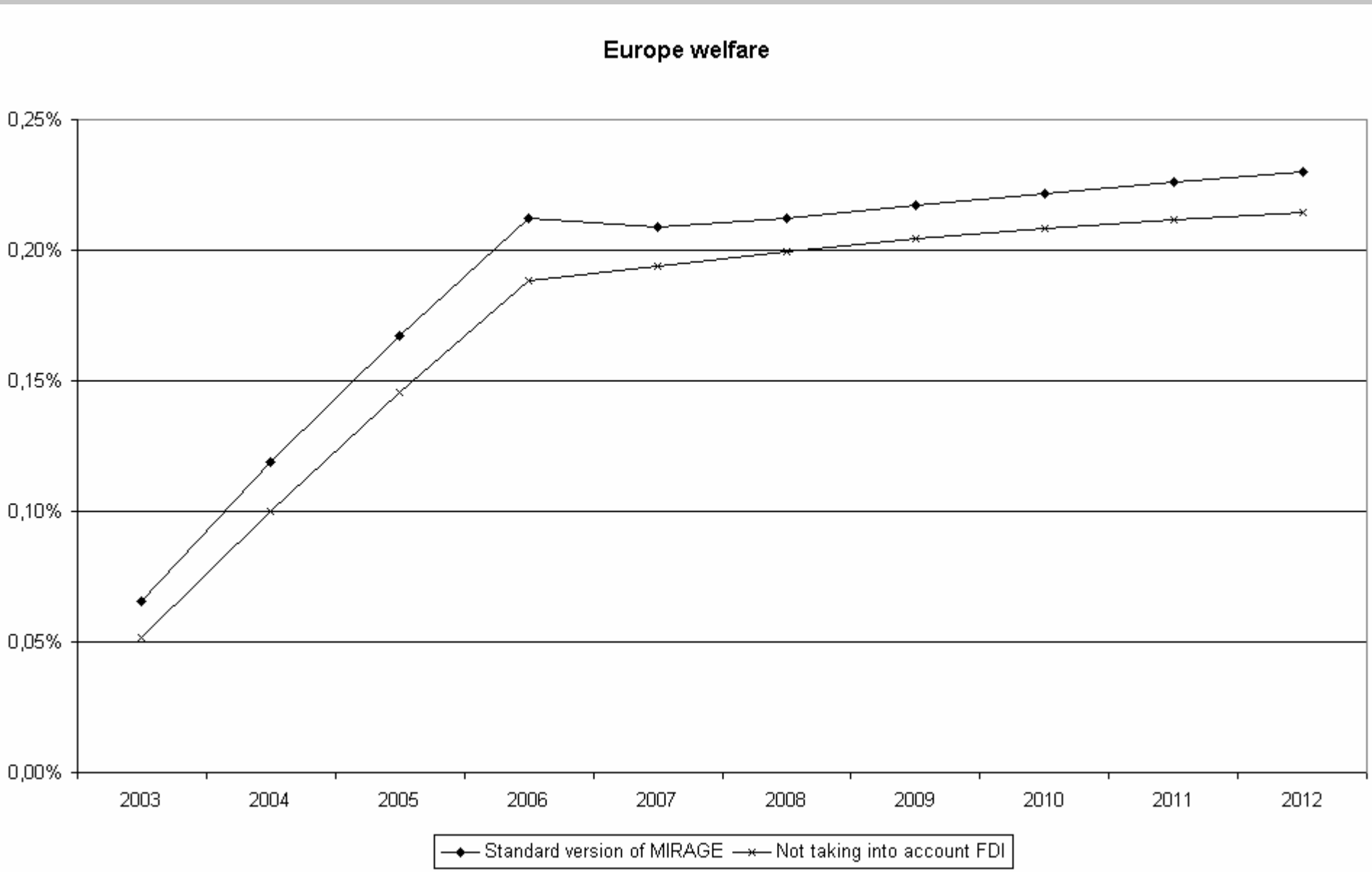
- First we had to build the FDI database, then to find the formulation
- The idea is: any investor in one region *r* can invest in all sectors of all regions. In a risky environment he will allocate among all possible investment according to the return rate.
- The portfolio allocation is given by:

$$\frac{PK_s I_{irs}}{S_r} = \frac{A_{irs} PK_s K_{is} e^{\alpha wk_{is}}}{\sum_{i,s} A_{irs} PK_s K_{is} e^{\alpha wk_{is}}}$$

Impact of FDI

Impacts of our taking account of FDI are tiny for this simulation. This seems to be mainly due to the fact that FDI is negligible compared to local investment in the region concerned, and FDI react the same way as local investment reacts in the alternate model.

Further investigation remain necessary to find a better explanation for FDI in countries that open their markets.


Europe welfare
0,25%
0,20%
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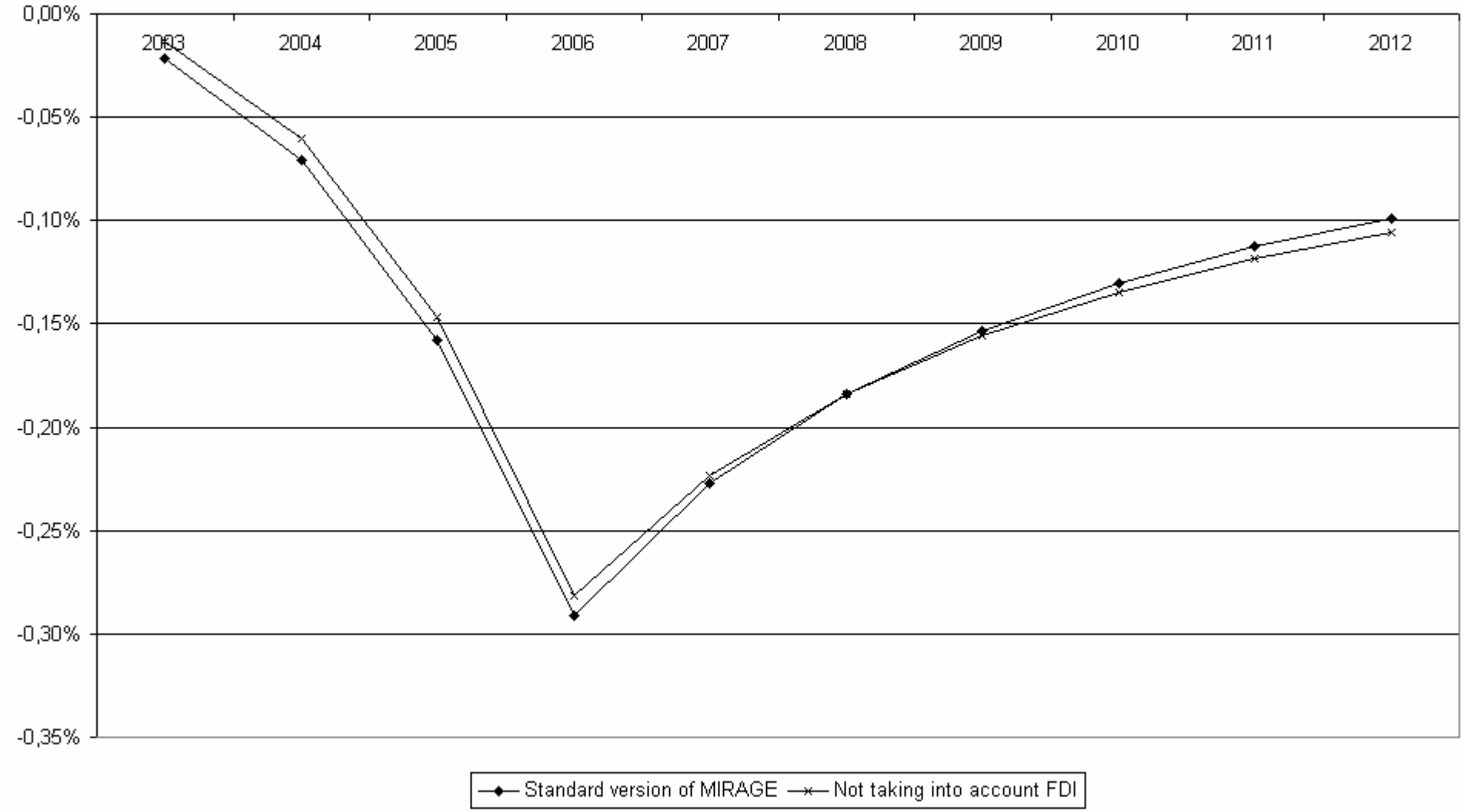
Standard version of MIRAGE
Not taking into account FDI


European Periphery welfare
0,00%
-0,05%
-0,10%
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-0,20%
-0,25%
-0,30%
-0,35%
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Standard version of MIRAGE
Not taking into account FDI

Conclusions

- No huge discrepancy with standard models due to our 3 assumptions
- Diversion effects are strongly modified when one take into account quality differences
- Welfare effects are emphasized when imperfect competition is introduced in the model
- FDI has still to be investigated further