Uniwersytet Warszawski
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Norwegian Centre for Transport Research

Are Transboundary Nature Protected Areas International Public Goods?

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Motivation

Transboundary Nature Protected Areas (NPAs) – contiguous natural complexes, artificially divided with the state borders and protected on every side of the border

- 188 transboundary NPAs in 112 countries S=3.2mio sq.km (≅India). 17% of total PAs' [Chester, 2008]

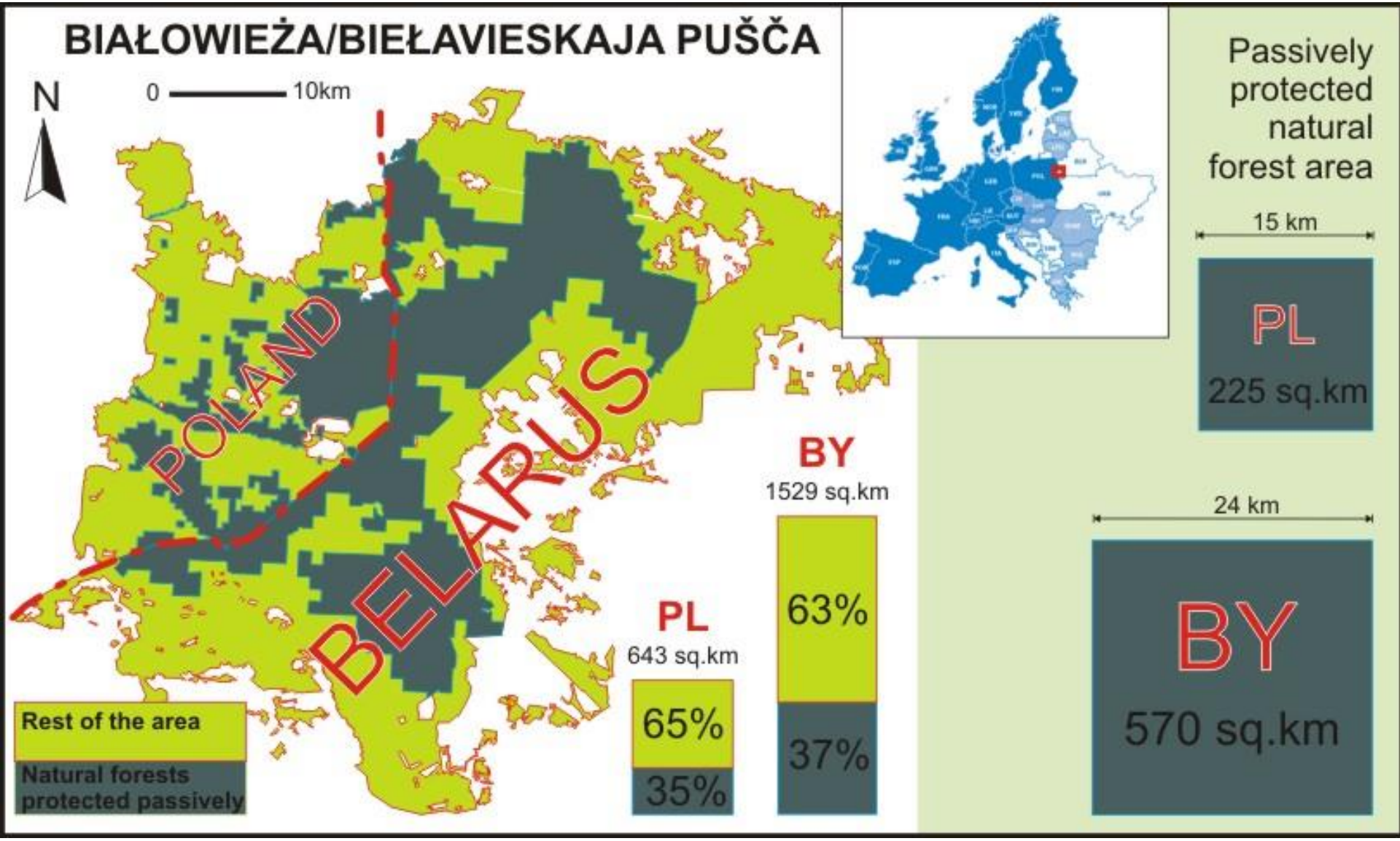
- Significant scientific and popular literature in natural disciplines.

- Scarce literature in economics [Busch, 2008] including empirical studies.

Are Transboundary NPAs **International Public Goods?**

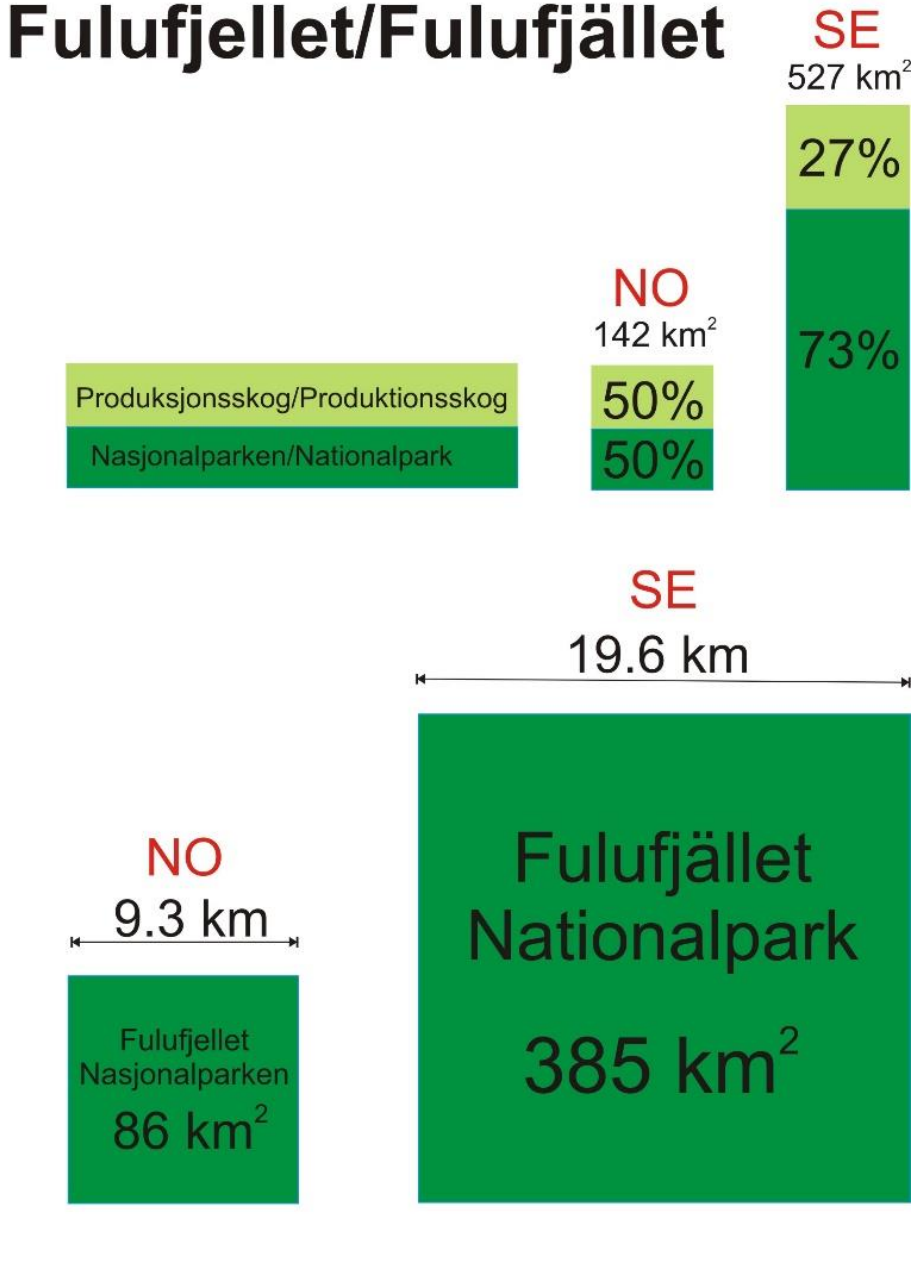
- Natural sciences: definitely.
- Economics: far from trivial (especially in the case of terrestrial NPAs).
- Empirical evidence is needed if the theory is consistent with people's real preferences.
- Research hypothesis: *transboundary NPAs are International Public Goods in accordance with people's preferences*

Study sites

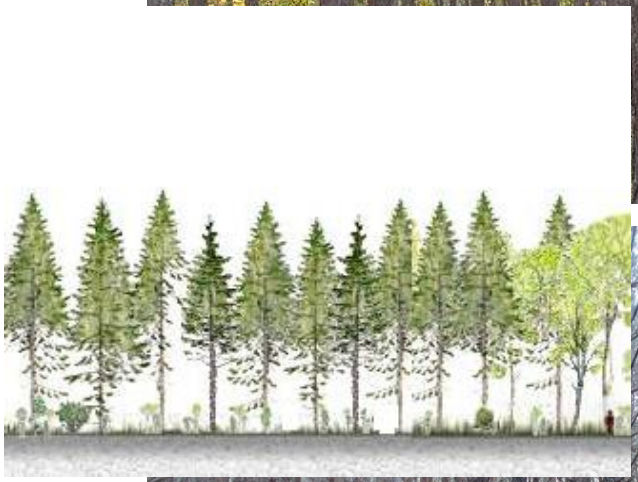

BIAŁOWIEŻA/BIEŁAVIESKAJA PUŠČA
N
0
10km
POLAND
BELARUS
Rest of the area
Natural forests protected passively
PL
643 sq.km
65%
35%
BY
1529 sq.km
63%
37%
Passively protected natural forest area
15 km
PL
225 sq.km
24 km
BY
570 sq.km

Study sites

Lilladålen NR
Mörkret
N
S
Fulan
Fulufjället
Nationalpark
Gördalen
SVERIGE
Linnes
Bergaå
Morkbäckssätern
Fregn NR
Fulufjellet
Nasjonalparken
NORGE
NO
SE
0
10 km


Fulufjellet/Fulufjället
SE
527 km²
27%
73%
NO
142 km²
50%
50%
Produksjonsskog/Produktionsskog
Nasjonalparken/Nationalpark
SE
19.6 km
Fulufjället
Nationalpark
385 km²
NO
9.3 km
Fulufjellet
Nasjonalparken
86 km²

Intact Natural Forest vs. Production Forest



Empirical study

Methodology – stated preferences, DCM, Sixteen choice-sets, best choice question.

Comparative study – two mutually consistent bilateral surveys of people's preferences:

- Białowieża/Biełavieskaja Pušča (PL/BY, CAPI, N=1000+1000);
- Fulufjellet/Fulufjället (NO/SE, CAWI, N=1000+1000).

Payment vehicle – compulsory income tax increase for five years, charged nationally and transferred to bilateral target fund functioning under auspices of respectable international organisation (e.g. UNESCO).

Survey scenario:

- introduces transboundary NPAs as a common good of the both nations involved;
- contemplates rewilding.

Survey scenario: rewilding

Core idea of the scenario: passive protection regime extension => forest ecosystems' restoration in a long run.

With this respect, every spatial unit (sq.km) of the ought-to-be-protected area is the same, regardless of its particular location on either side of the border

Respondent's utility function specification

$V=\beta_{SD}*S_D + \beta_{SF}*S_F$
where

S_D – additional strict reserve area on domestic side. km^2

S_F – additional strict reserve area on foreign side. km^2

Hypothesis testing: if statistically $\beta_D = \beta_F$ =>

H0: *transboundary NPA qualifies as the* ***international public good*** *in accordance with the preferences of the appropriate population* – **cannot be rejected**

Otherwise two separate national public goods exist instead of the international one

Why could betas differ? Attitudes

Factors of potential differences in preferences for protection extension domestically vs. abroad	***Appropriate attitudinal questions formulation in the questionnaire***
Difference in preferences, influenced by use value expectations	*I expect to visit the domestic side of the site under consideration in the next five years*
	I expect to visit the foreign side of site under consideration in the next five years
Difference in preferences, caused by various case-specific disproportions between the countries	*I believe that the participation of Poland (Sweden) in the programme funding should be higher than the participation of Norway (Belarus) because the Polish (Swedish) population is greater than the Belarusian (Norwegian) population*
	I believe that the participation of Poland (Norway) in the programme funding should be higher than the participation of Belarus (Sweden) because Poles (Norwegians) are wealthier
Difference in preferences, arising from suspicions towards the foreign party	*I am afraid that money spent on the protection on the foreign side of the site under consideration could be misused*
	I expect the domestic party to comply with the international agreement to a larger extent than the foreign party
Differences in preferences dependent of unilateral conservation action of the foreign party	*I expect the foireign party to extend the passive protection regime on its side of the border whether or not the bilateral programme discussed in the questionnaire is implemented*
Differences in preferences caused by “patriotic” considerations	*I prefer better to protect the domestic side of the site under consideration than its foreign side because it belongs to my country*

Hybrid choice models allow to incorporate perceptions and cognitive processes into a Random Utility Model (RUM) framework as latent variables interconnecting attitudes with preferences.

Modelling Results (MXL)

	Willingness-To-Pay, X10 EUR (2015 PPP) per year during the next five years							
	Fulufje/ället				Białowieżą			
	Norway		Sweden		Poland		Belarus	
var.	coef.	st.dev.	coef.	st.dev.	coef.	st.dev.	coef.	st.dev.
SQ	-2.24***	7.37***	-2.17***	7.95***	-1.00***	3.07***	7.04***	25.68***
NO+20km² BY+35km²	1.23***	0.71***	0.60***	0.24***	-0.03	0.02	1.21**	0.26
NO+40km² BY+70km²	1.95***	0.87***	0.66***	0.72***	-0.06	0.13**	2.31***	0.18
NO+60km² BY+105km²	2.30***	1.57***	0.85***	0.79***	-0.15***	0.40***	0.80	4.52***
SE+20km² PL+35km²	0.37***	0.18***	1.09***	0.42***	0.65***	0.35***	0.63	2.30**
SE+40km² PL+70km²	0.60***	0.51***	1.61***	0.57***	0.94***	0.61***	-2.66***	0.26
SE+60km² PL+105 km²	0.66***	0.69***	1.96***	1.17***	1.19***	1.00	-1.80***	0.07
Model characteristics								
LL0	-17276.37		-20010.45		-12095.34		-12067.98	
LL	-10386.57		-11862.14		-7116.83		-9710.78	
McFadden R²	0.4		0.41		0.41		0.2	
n	16011 (1000.69)		18668 (1166.75)		12080 (755)		12208 (763)	
k	16		16		16		16	

IPG hypothesis failed for all countries (LR-test) => two separate public goods exist instead

Hybrid MXL Model: looking for IPG-state attitudinal drivers

Utility function modified for the HMXL: $V = WTP_t*(S_d + S_f) + \Delta*S_f$

IPG criterion: $\Delta=0$.

Latent variables' impact:

$V = WTP_t*(S_d + S_f)+ \Delta*S_f + \Delta_{LV}*LV*S_f$

or

$V = WTP_t*(S_d + S_f)* + S_f*[\Delta+ \Delta_{LV}*LV]$ (*)

where $[\Delta+ \Delta_{LV}*LV]$ is simulated impact of LVs and attitudes

If $|\Delta| > |\Delta + \Delta_{LVi}*LV_i|$ – then LV_i is a true IPG-driver

Hybrid MXL Modelling Results

Programme attributes	Fulufje/ället				Białowieża			
	Norway		Sweden		Belarus		Poland	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
SQ	-2.91***	2.10***	-3.97***	6.53***	5.43***	26.26***	-0.96***	2.64***
WTP for 100km^2 of total extension, x10EUR (2015 PPP)	3.84***	2.07***	3.49***	4.03***	0.68	4.15***	1.07***	1.50***
Δ for extension abroad, x10EUR (2015 PPP)	-3.01***	0.60***	-1.92***	0.15**	-4.31***	1.80	-1.53***	0.06
Interactions of LVs	Measurement equation	Interaction with Δ, x10EUR (2015 PPP)	Measurement equation	Interaction with Δ, x10EUR (2015 PPP)	Measurement equation	Interaction with Δ, x10EUR (2015 PPP)	Measurement equation	Interaction with Δ, x10EUR (2015 PPP)
Intend to visit 'our' part	0.42***	-1.16***	0.13	-1.14***	1.72*	1.39**	0.63**	-0.43***
Intend to visit 'their' part	0.20	-0.97***	0.22	0.87***	1.57	0.23	0.88***	0.78***
SE/PL should pay more because - population	0.14**	1.71***	0.66**	0.26***	0.95*	-1.32	0.17**	-1.20***
NO/PL should pay more because - wealth	0.54***	0.56***	0.03	-0.35***	3.68*	-0.53	0.05	-0.43***
Money transferred abroad can be misused / stolen	1.60***	0.12*	0.20	-0.84***	0.06	1.26	0.20	0.28***
"We" are more responsible	0.11*	-2.93***	0.38***	1.05***	0.12	-0.74	0.33	0.29***
They' will extend anyway	0.51***	0.24**	0.23	0.76***	0.26	0.62	0.32**	-0.77***
WTP for 'our' more - patriotic reasons	0.36***	-1.33***	0.73***	-1.68***	0.55	0.44	0.92**	-0.20

Simulation: impact of attitudes on IPG-state

	NO	SE	BY	PL
Additional WTP for extension abroad	**-3.01**	**-1.92**	**-4.31**	**-1.53**
Intend to visit "our" part	**-4.17**	-3.06	**-2.92**	**-1.96**
Intend to visit "their" part	-3.98	-1.04	-4.31	**-0.75**
SE/PL should pay more because of population disproportion	**-1.30**	**-1.66**	-4.31	**-2.74**
NO/PL should pay more because of wealth disproportion	**-2.45**	-2.27	-4.31	-1.97
Money transferred abroad can be misused / stolen	**-2.89**	-2.76	-4.31	-1.26
"We" are more responsible	**-5.94**	**-0.86**	-4.31	-1.24
"They" will extend anyway	**-2.77**	-1.16	-4.31	**-2.30**
WTP for 'our' more - 'patriotic' considerations	**-4.34**	**-3.60**	-4.31	-1.53

Initial additional WTP for extension abroad

Attitudes being IPG-drivers

Attitudes, shifting preferences out from IPG-state

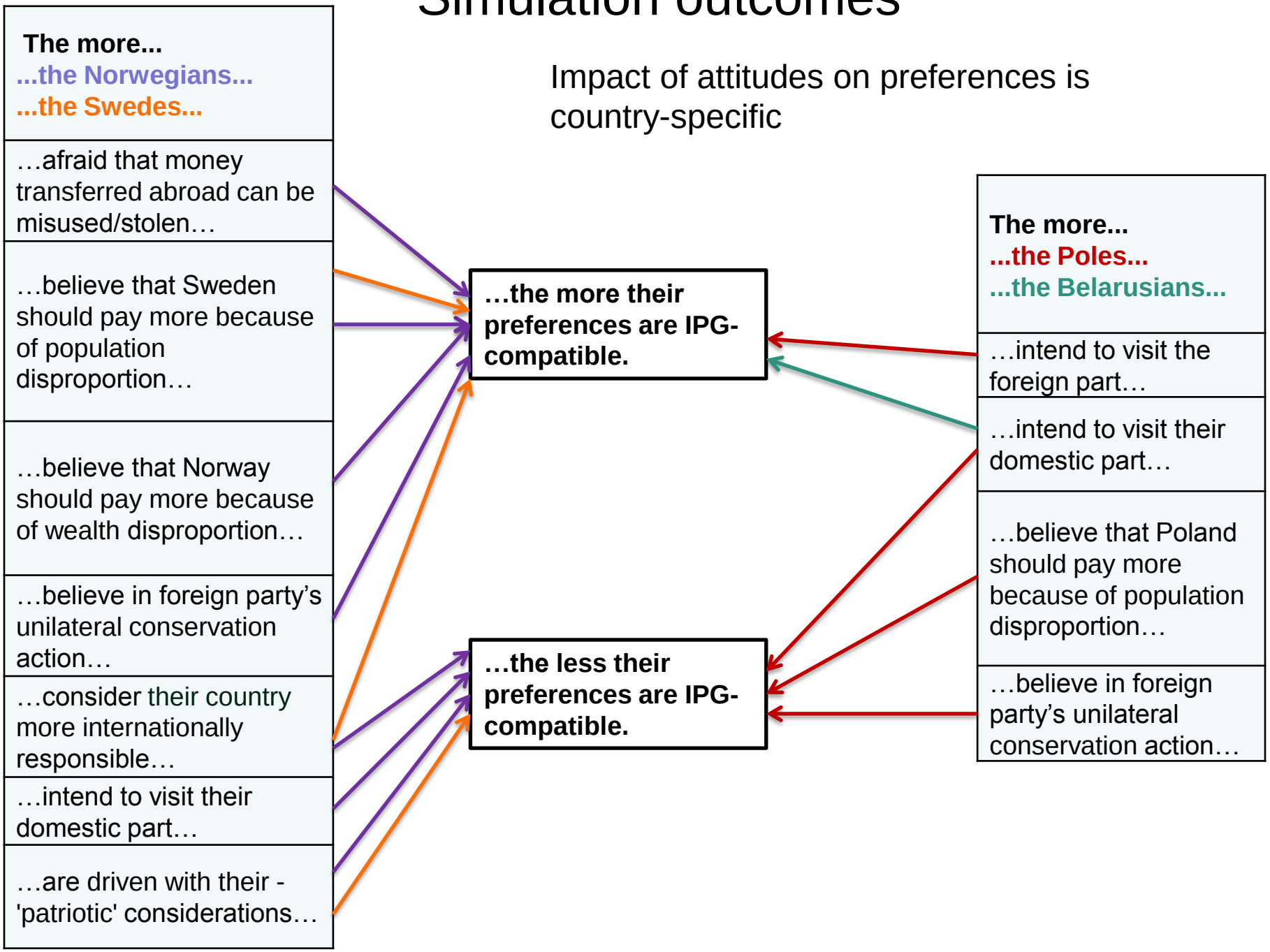
Appropriate LV shifts preferences towards IPG-state, however without clear link to attitudes (being driven by some unobserved factors)

Appropriate LV shifts preferences out from IPG-state, however without clear link to attitudes (being driven by some unobserved factors)

Appropriate latent variables do not shift preferences in either direction

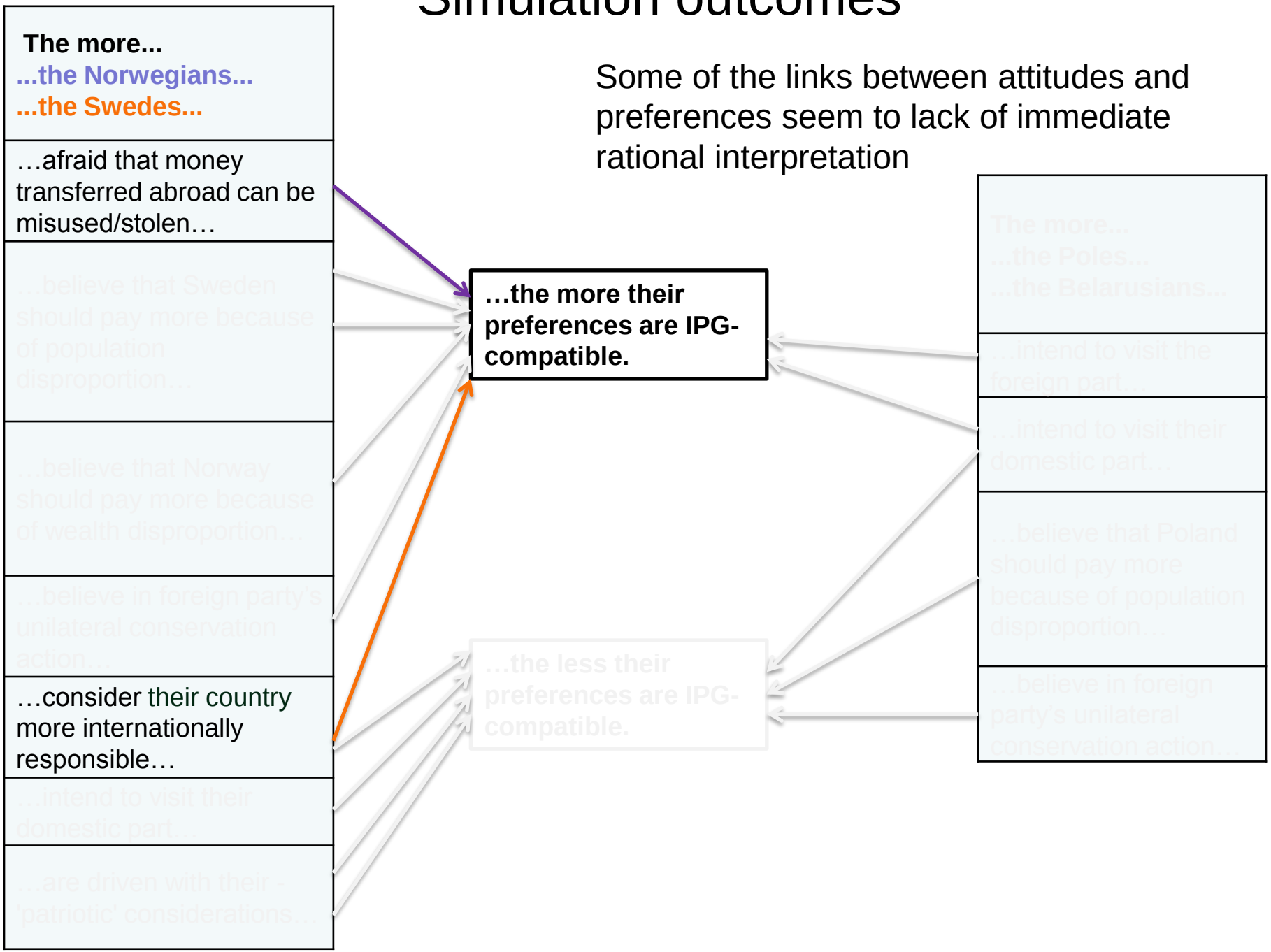
Simulation outcomes

Impact of attitudes on preferences is country-specific



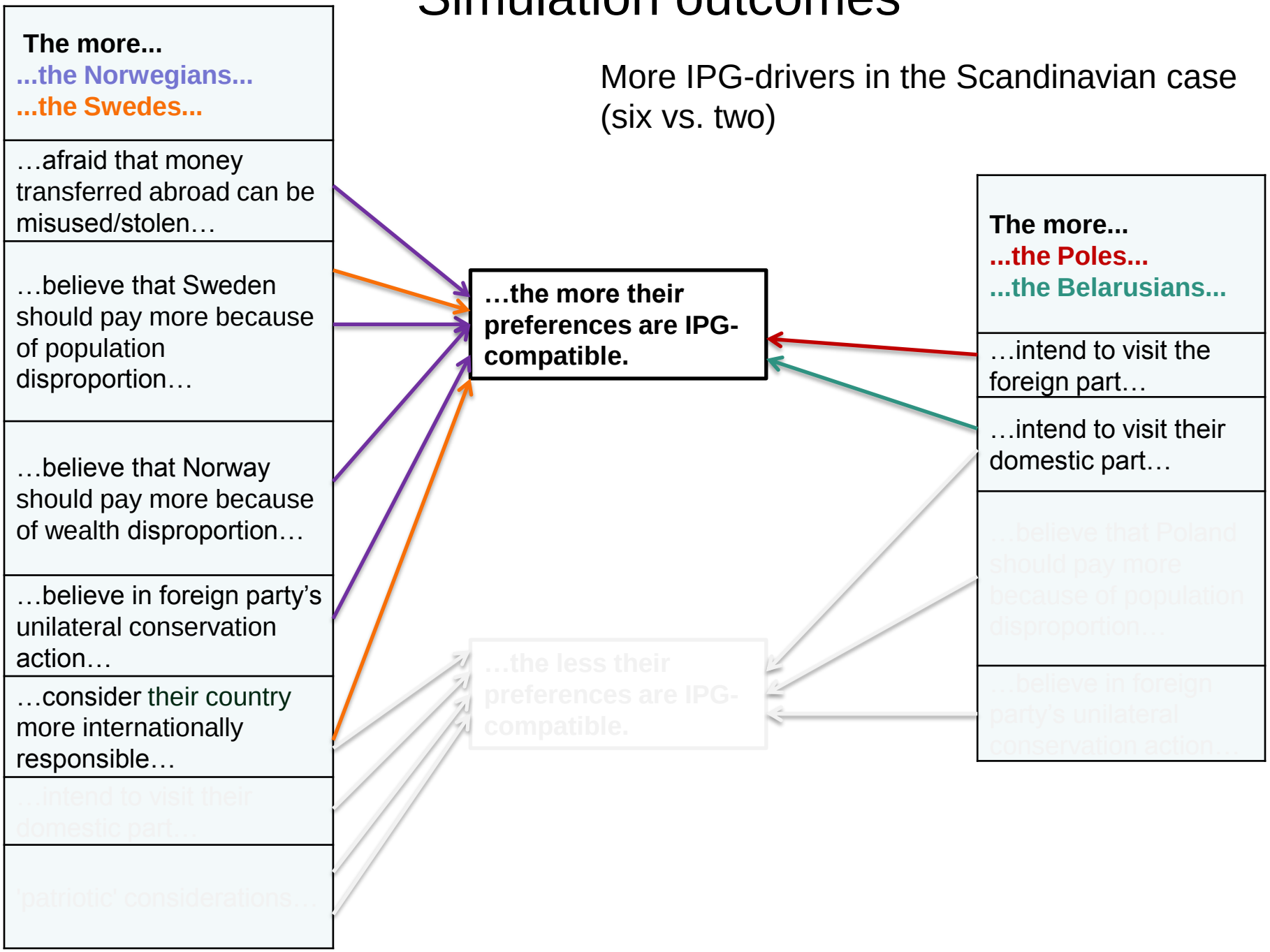
Simulation outcomes

Some of the links between attitudes and preferences seem to lack of immediate rational interpretation



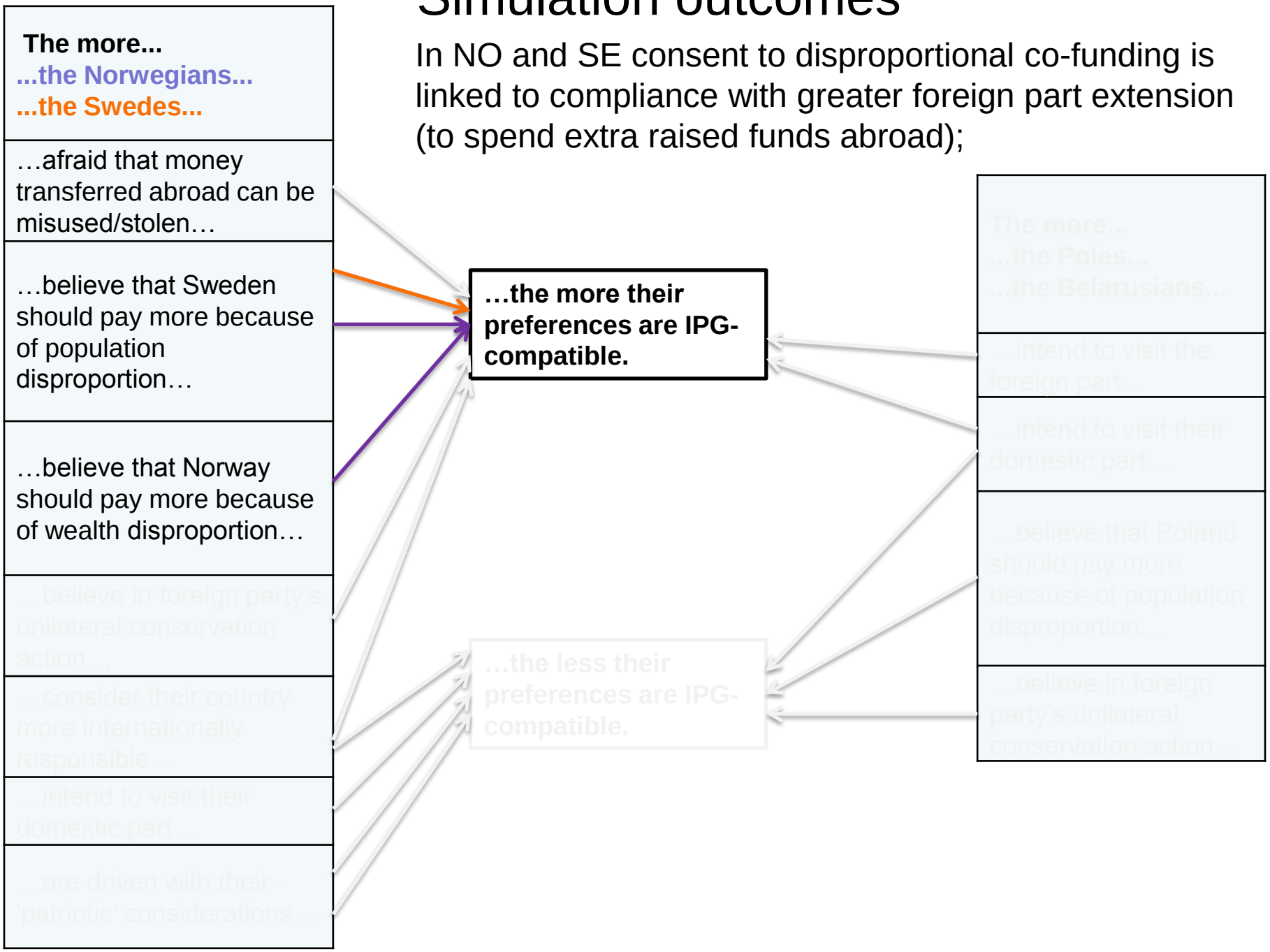
Simulation outcomes

More IPG-drivers in the Scandinavian case (six vs. two)



Simulation outcomes

In NO and SE consent to disproportional co-funding is linked to compliance with greater foreign part extension (to spend extra raised funds abroad);



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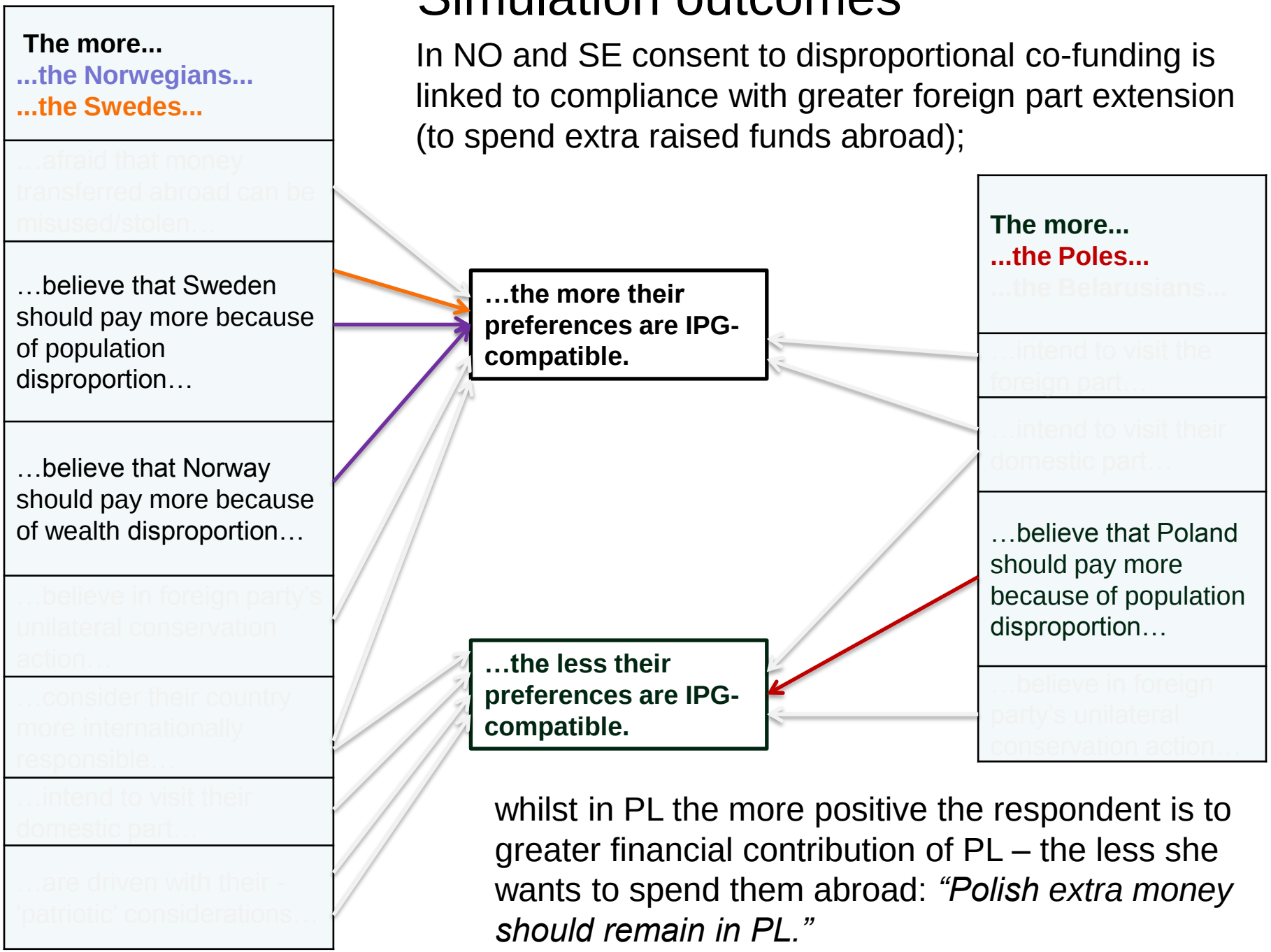
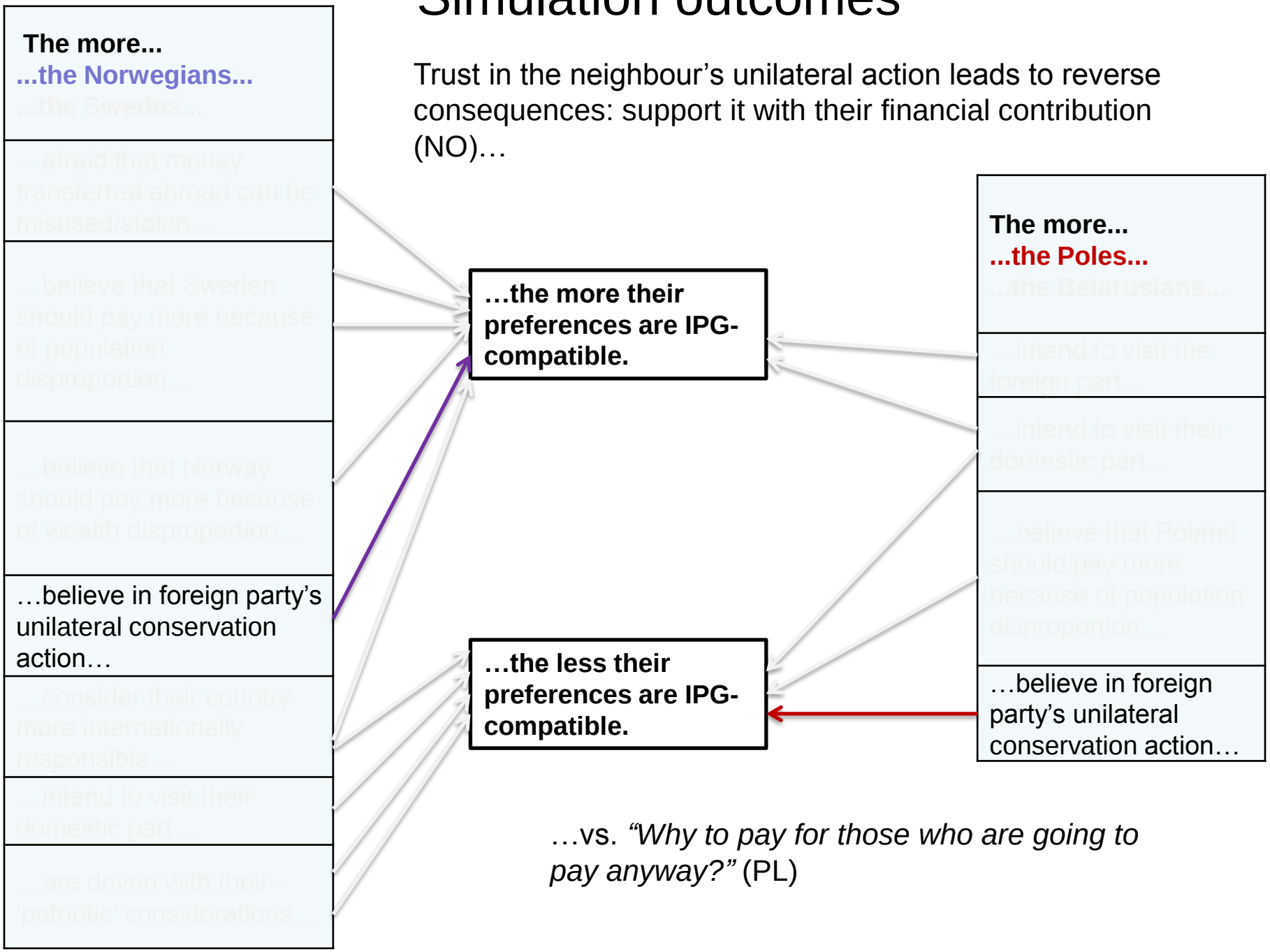


whilst in PL the more positive the respondent is to greater financial contribution of PL – the less she wants to spend them abroad: *"Polish extra money should remain in PL."*

Simulation outcomes

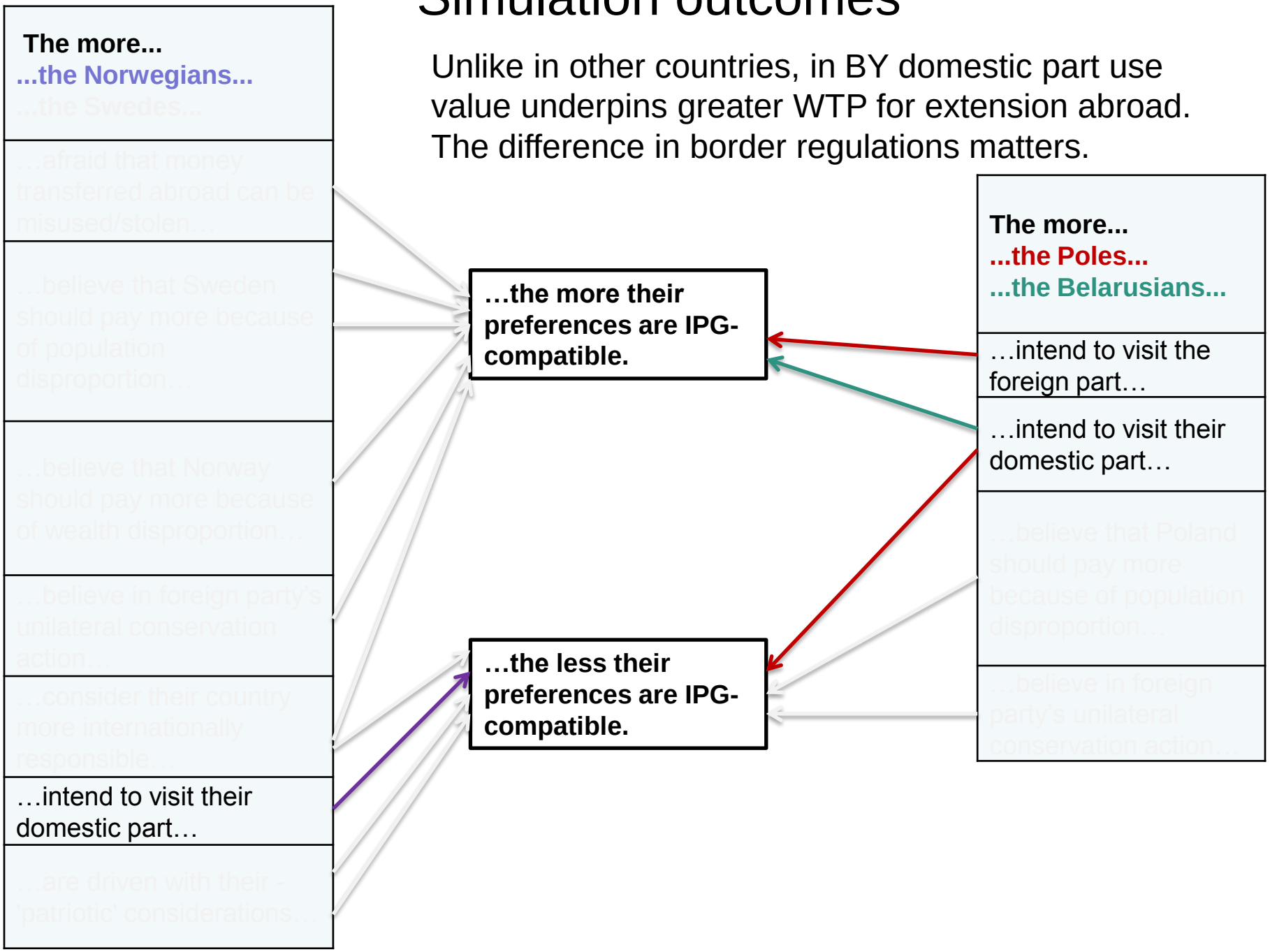
Trust in the neighbour's unilateral action leads to reverse consequences: support it with their financial contribution (NO)…



…vs. *"Why to pay for those who are going to pay anyway?"* (PL)

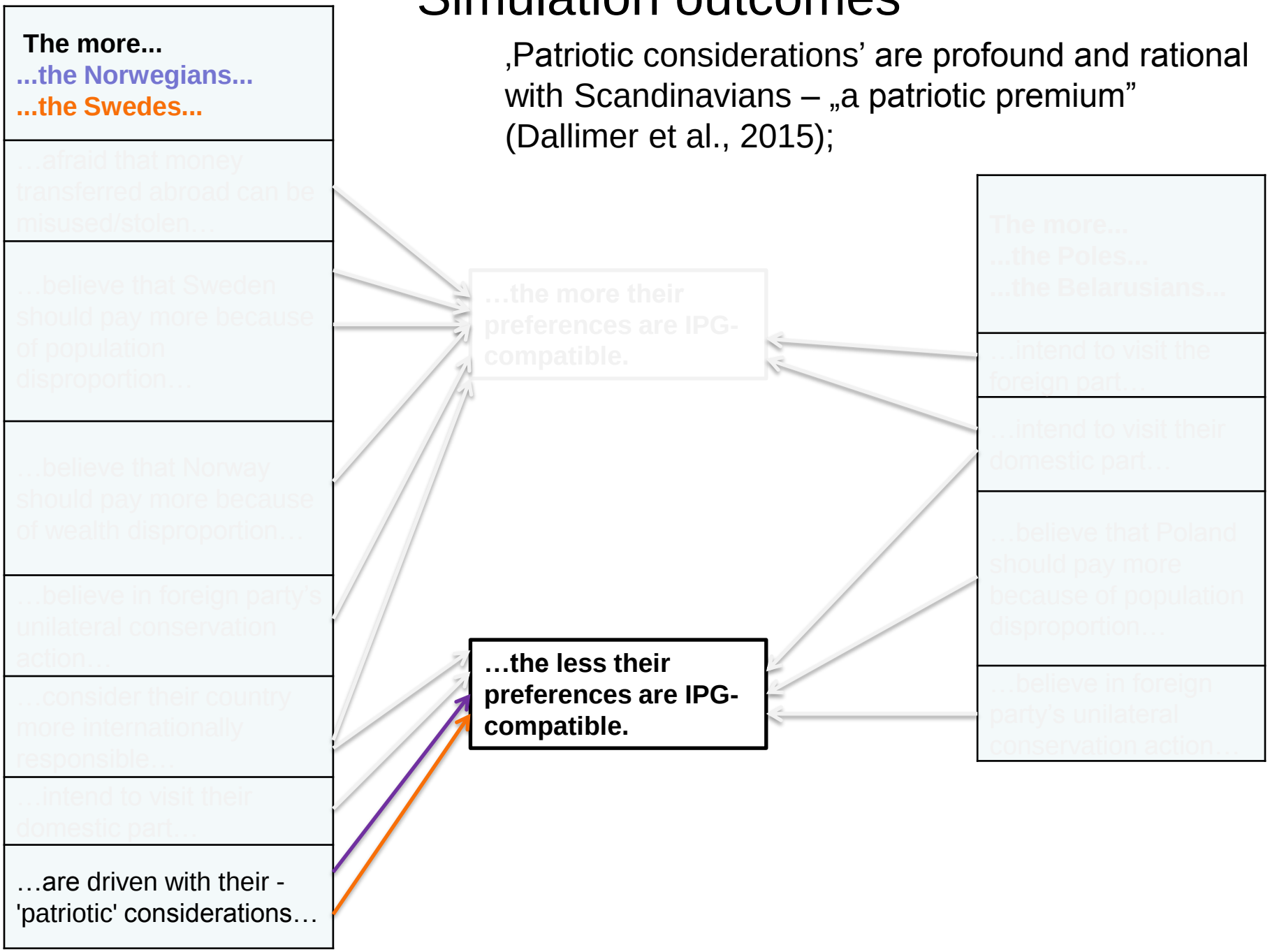
Simulation outcomes

Unlike in other countries, in BY domestic part use value underpins greater WTP for extension abroad. The difference in border regulations matters.



Simulation outcomes

‚Patriotic considerations' are profound and rational with Scandinavians – „a patriotic premium" (Dallimer et al., 2015);



Simulation outcomes

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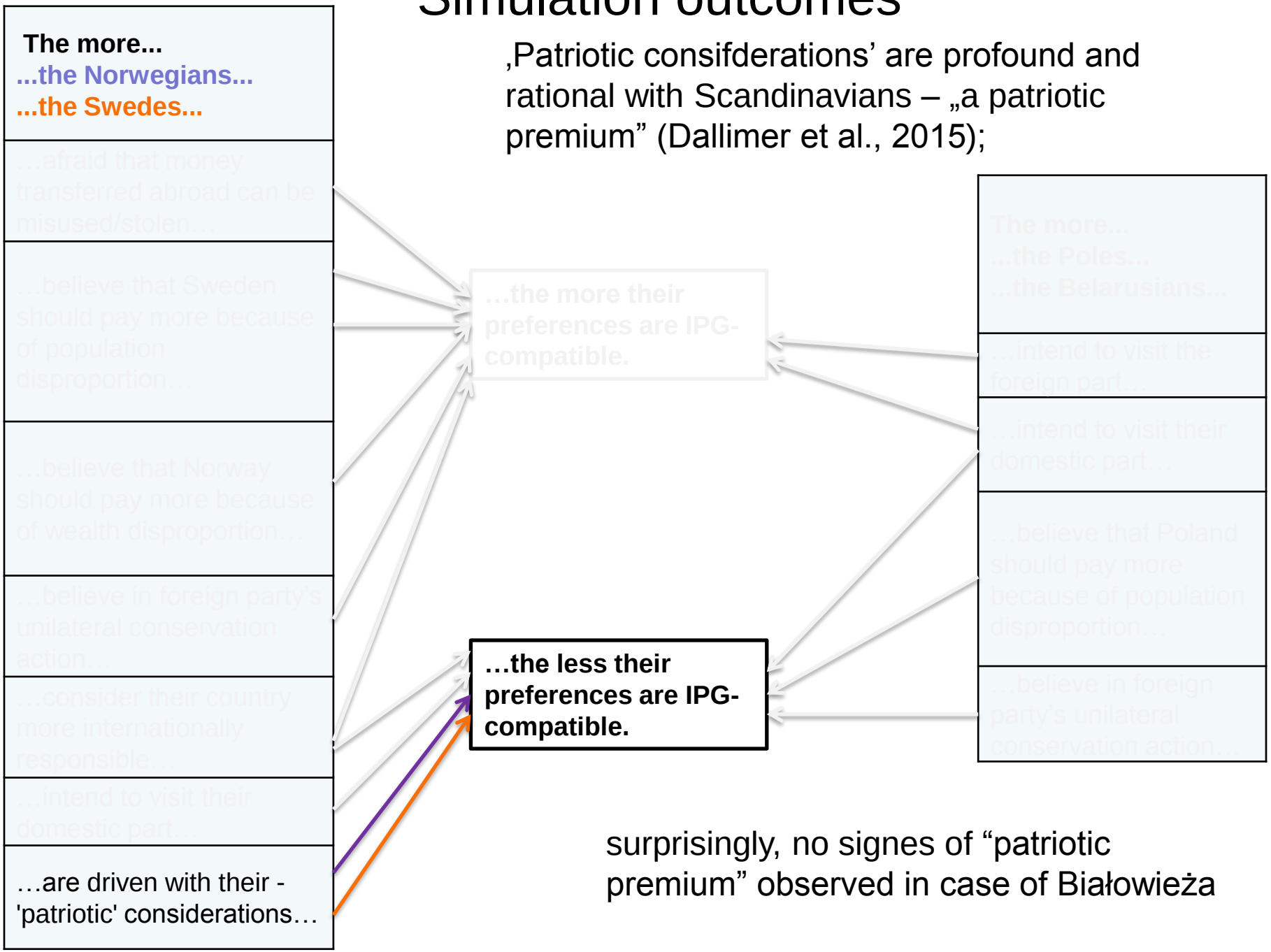

surprisingly, no signes of "patriotic premium" observed in case of Białowieża

Conclusions

- The true IPG-state exists in neither case.
- Respondents from NO, SE are willing to protect more both at home and abroad.
- Respondents from PL are willing to protect more at home only.
- Respondents from BY are satisfied with the current state.
- Differences in preferences are underpinned by country-specific attitudinal profiles (not necessarily rational).
- Scandinavian case is closer to the IPG-state, due to more co-operative preferences of respondents.
- State borders seem to matter.
- “Patriotic premium”.

Thank you for your attention!

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