



Diversifying in green technologies: does political support matter?

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structure

1. green diversification and relatedness
2. transitions and political support
3. study on diversification in green technologies in European regions 2000-2013





1. green diversification and relatedness

- regions show a different ability to develop new specialization in green activities (e.g. Barbieri and Consoli 2019): why is that?
- some studies suggest that **relatedness** is a crucial driver behind green diversification of regions (Van den Berge and Weterings 2014; Tanner 2014, 2016; Montresor and Quatraro 2018; Corradini 2019)
- a region is more likely to diversify into new green activities **related to existing activities in region** because they provide local capabilities on which new green activities can draw (Neffke et al. 2011)
- this tends to be **in contrast** with **transition studies** claiming that green activities are disruptive and transformative (e.g. Markard et al. 2012)





2. transitions and political support

- transition studies claim that **strong policy intervention** is crucial in explaining why regions show different abilities to develop green activities
- **case studies** suggest that environmental policies differ widely across regions (e.g. Cooke 2010)
- no systematic approach: little understanding of whether **national and regional political support** makes a difference (exception: Guidici et al. 2019)
- objective is **to tackle this gap in literature**: to assess the relative importance of political support (at national and regional scale) **AND** regional capabilities for green diversification in regions





3. European study on green diversification in regions

- following other studies on technological diversification (Kogler et al. 2013; Rigby 2015; Balland et al. 2018): emergence of new green specializations in regions, based on patent data
- **OECD REGPAT database:** study on green diversification in period 2000-2013 in 95 NUTS2 European regions for which regional data are available (Austria, Belgium, France, Germany, Italy, the Netherlands, Spain)
- **identification of green technologies:** linking them to 107 3-digit technology classes (OECD 2016)





3. European study on green diversification in regions

- **entry of new green specialization** in a region:
 $RCA > 1$ in a window of 5 years
- $\Delta RCA_{izt,t+4} \geq 0.5$; $\Delta PAT_{izt,t+4} > 0$; $RCA > 1$ at least for 1 subsequent year
- relatedness to existing technological specialization in the region at t
- relatedness: spatial co-occurrence of 2 technologies ($RCA > 1$)
- relatedness density: average relatedness of a potential green technology z to the set of technologies s in which a region at t is specialized





3. European study on green diversification in regions

- **political support to environmental policy:**
 - (1) political stance of regional and national government (proxied by political affiliation of the government leader) regarding environmental policy

Manifesto Project Database: continuous variable that measures to what extent political parties, in their political manifestos, regard environmental issues as a political priority

- (2) share of votes for Green parties at regional elections





3. European study on green diversification in regions

- **control variables:**
 - specialization in dirty technology: 1 or 0
 - GDP per capita
 - share of R&D in GDP
 - share of population with higher education
 - share of elderly population
 - population density
 - unemployment rate





3. European study on green diversification in regions

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
Relatedness	0.49172*** (0.01638)	0.49171*** (0.01638)	0.49160*** (0.01638)	0.49172*** (0.01638)	0.49159*** (0.01638)	0.49165*** (0.01638)	0.50139*** (0.01685)	0.48968*** (0.01631)	0.50151*** (0.01688)
Env. (Reg)		-0.00034 (0.00120)			0.00029 (0.00127)	-0.00115 (0.00151)			-0.00510*** (0.00171)
Env. (Nat)			-0.00316* (0.00174)		-0.00353* (0.00185)		0.00493** (0.00201)		0.00653*** (0.00223)
Green votes				0.00019 (0.00182)	0.00103 (0.00192)			0.00609*** (0.00206)	0.00631*** (0.00215)
Relatedness * Env. (Reg)						0.00749 (0.01585)			0.04960*** (0.01816)
Relatedness * Env. (Nat)							-0.07480*** (0.01983)		-0.09285*** (0.02264)
Relatedness * Green votes								-0.05359*** (0.01601)	-0.04805*** (0.01628)
GDP per capita	-0.00000 (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000** (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000** (0.00000)
R&D	-0.00155 (0.00121)	-0.00151 (0.00121)	-0.00129 (0.00121)	-0.00157 (0.00122)	-0.00139 (0.00122)	-0.00150 (0.00122)	-0.00133 (0.00118)	-0.00159 (0.00120)	-0.00144 (0.00119)
Human Capital	-0.00043 (0.00070)	-0.00040 (0.00070)	-0.00042 (0.00070)	-0.00043 (0.00070)	-0.00047 (0.00070)	-0.00040 (0.00070)	-0.00042 (0.00070)	-0.00043 (0.00070)	-0.00045 (0.00070)
Share elderly population	-0.07688 (0.18523)	-0.07455 (0.18533)	-0.10390 (0.18444)	-0.07895 (0.18670)	-0.12025 (0.18580)	-0.07455 (0.18533)	-0.10101 (0.18440)	-0.07973 (0.18674)	-0.11706 (0.18584)
Unemployment rate	0.00020 (0.00046)	0.00016 (0.00047)	-0.00010 (0.00047)	0.00020 (0.00046)	-0.00010 (0.00048)	0.00016 (0.00047)	-0.00010 (0.00047)	0.00019 (0.00046)	-0.00012 (0.00048)
Population density	0.00003 (0.00004)	0.00003 (0.00004)	0.00004 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00004 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)
Constant	-0.01231 (0.04242)	-0.01269 (0.04241)	0.00157 (0.04241)	-0.01167 (0.04312)	0.00694 (0.04328)	-0.01267 (0.04241)	-0.00012 (0.04238)	-0.01151 (0.04310)	0.00496 (0.04326)
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Overall R-sqr	0.061	0.061	0.061	0.061	0.061	0.061	0.062	0.062	0.062
N	39318	39318	39318	39318	39318	39318	39318	39318	39318

* p<0.1, ** p<0.05, *** p<0.01





3. European study on green diversification in regions

	(i)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
Dirty	-0.00610*** (0.00218)	-0.00565*** (0.00213)	-0.00558*** (0.00216)	-0.01662*** (0.00285)	-0.00558*** (0.00216)	-0.00516** (0.00220)	-0.00555** (0.00217)	-0.01592*** (0.00289)
Relatedness		0.49157*** (0.01637)	0.49144*** (0.01637)	0.44132*** (0.02208)	0.49144*** (0.01637)	0.49145*** (0.01637)	0.49144*** (0.01637)	0.44149*** (0.02208)
Env. (Reg)			0.00056 (0.00128)	0.00057 (0.00128)	0.00056 (0.00160)	0.00058 (0.00128)	0.00055 (0.00128)	-0.00018 (0.00167)
Env. (Nat)			-0.00347* (0.00185)	-0.00346* (0.00185)	-0.00347* (0.00185)	-0.00127 (0.00229)	-0.00349* (0.00185)	-0.00077 (0.00239)
Green votes			0.00098 (0.00192)	0.00098 (0.00192)	0.00098 (0.00192)	0.00074 (0.00192)	0.00080 (0.00217)	0.00027 (0.00220)
Dirty * Relatedness				0.10113*** (0.03260)				0.10077*** (0.03259)
Dirty * Env. (Reg)					-0.00001 (0.00198)			0.00153 (0.00223)
Dirty * Env. (Nat)						-0.00397 (0.00261)		-0.00490* (0.00295)
Dirty * Green votes							0.00040 (0.00212)	0.00097 (0.00220)
GDP per capita	-0.00000 (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000* (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)
R&D	-0.00205* (0.00117)	-0.00182 (0.00121)	-0.00168 (0.00123)	-0.00169 (0.00122)	-0.00168 (0.00124)	-0.00204 (0.00124)	-0.00166 (0.00124)	-0.00193 (0.00124)
Human Capital	-0.00064 (0.00071)	-0.00055 (0.00070)	-0.00061 (0.00071)	-0.00060 (0.00071)	-0.00061 (0.00071)	-0.00070 (0.00071)	-0.00060 (0.00071)	-0.00068 (0.00072)
Share elderly population	-0.11572 (0.18909)	-0.09038 (0.18546)	-0.13439 (0.18605)	-0.13220 (0.18604)	-0.13439 (0.18606)	-0.13381 (0.18610)	-0.13487 (0.18622)	-0.13175 (0.18630)
Unemployment rate	0.00010 (0.00046)	0.00005 (0.00046)	-0.00021 (0.00048)	-0.00021 (0.00048)	-0.00021 (0.00048)	-0.00018 (0.00048)	-0.00022 (0.00048)	-0.00021 (0.00048)
Population density	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)
Constant	0.05115 (0.04318)	-0.00992 (0.04244)	0.00917 (0.04329)	0.01406 (0.04327)	0.00917 (0.04329)	0.00845 (0.04332)	0.00919 (0.04329)	0.01323 (0.04331)
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Region fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Overall R-sqr	0.023	0.061	0.061	0.062	0.061	0.061	0.061	0.062
N	39318	39318	39318	39318	39318	39318	39318	39318

* p<0.1, ** p<0.05, *** p<0.01





4. main findings

- **relatedness: positive effect** on green diversification of regions
- **little support for political support**, though we found a positive (but weak) effect of national support and green votes at regional elections
- **negative interaction effect:** relatedness and national political support and green votes: weakens effect of relatedness
- **dirty technology: negative effect**
- **positive interaction effect:** dirty technology and relatedness: at high levels of relatedness, the negative effect of dirty technology is taken away





Universiteit Utrecht

paper is available as
working (in progress 😊) paper:

Papers in Evolutionary Economic Geography
2019, no.19.22

thank you for your attention!



University of
Stavanger



3. European study on green diversification in regions

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
Relatedness	0.49172*** (0.01638)	0.49173*** (0.01638)	0.49172*** (0.01638)	0.49173*** (0.01638)	0.49173*** (0.01638)	0.49172*** (0.01638)	0.50055*** (0.01678)	0.49040*** (0.01634)	0.50183*** (0.01693)
Sum_Lags_Env. (Reg)		0.00051 (0.00044)			0.00082 (0.00054)	0.00102** (0.00049)			-0.00022 (0.00064)
Sum_Lags_Env. (Nat)			-0.00017 (0.00057)		-0.00074 (0.00070)		0.00158*** (0.00061)		0.00146* (0.00078)
Sum_Lags_Green votes				-0.00004 (0.00040)	-0.00005 (0.00040)			0.00094** (0.00043)	0.00072 (0.00044)
GDP per capita	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000 (0.00000)	-0.00000 (0.00000)
R&D	-0.00155 (0.00121)	-0.00151 (0.00121)	-0.00158 (0.00121)	-0.00157 (0.00121)	-0.00165 (0.00121)	-0.00151 (0.00120)	-0.00162 (0.00118)	-0.00157 (0.00120)	-0.00169 (0.00118)
Human Capital	-0.00043 (0.00070)	-0.00065 (0.00072)	-0.00036 (0.00073)	-0.00043 (0.00070)	-0.00052 (0.00073)	-0.00065 (0.00072)	-0.00036 (0.00072)	-0.00043 (0.00070)	-0.00052 (0.00073)
Share elderly population	-0.07688 (0.18523)	-0.08269 (0.18549)	-0.09713 (0.19336)	-0.07663 (0.18560)	-0.17308 (0.20246)	-0.08264 (0.18551)	-0.09413 (0.19326)	-0.07661 (0.18570)	-0.17090 (0.20245)
Unemployment rate	0.00020 (0.00046)	0.00019 (0.00046)	0.00021 (0.00046)	0.00022 (0.00049)	0.00026 (0.00049)	0.00019 (0.00046)	0.00020 (0.00046)	0.00022 (0.00049)	0.00026 (0.00049)
Population density	0.00003 (0.00004)	0.00004 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00004 (0.00004)	0.00003 (0.00004)	0.00004 (0.00004)	0.00003 (0.00004)
Relatedness * Sum_Lags_Env. (Reg)						-0.00480 (0.00413)			0.00968* (0.00541)
Relatedness * Sum_Lags_Env. (Nat)							-0.01620*** (0.00427)		-0.02047*** (0.00553)
Relatedness * Sum_Lags_Green votes								-0.00907*** (0.00321)	-0.00725** (0.00323)
Constant	-0.01231 (0.04242)	-0.00420 (0.04345)	-0.01026 (0.04252)	-0.01273 (0.04320)	0.00902 (0.04582)	-0.00417 (0.04346)	-0.01170 (0.04250)	-0.01293 (0.04321)	0.00722 (0.04579)
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Overall R-sqr	0.061	0.061	0.061	0.061	0.061	0.061	0.062	0.062	0.062
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3. European study on green diversification in regions

	LPM		Probit		Logit		Interaction Variables
Relatedness	0,48	***	0,43	***	0,44	***	Env (Reg) = min
	0,49	***	0,47	***	0,49	***	Env (Reg) = Q1
	0,49	***	0,48	***	0,50	***	Env (Reg) = Q2
	0,50	***	0,50	***	0,52	***	Env (Reg) = Q3
	0,53	***	0,63	***	0,67	***	Env (Reg) = max
Relatedness	0,64	***	0,50	***	0,52	***	Env (Nat) = min
	0,53	***	0,49	***	0,51	***	Env (Nat) = Q1
	0,49	***	0,49	***	0,50	***	Env (Nat) = Q2
	0,47	***	0,48	***	0,50	***	Env (Nat) = Q3
	0,34	***	0,47	***	0,49	***	Env (Nat) = max
Relatedness	0,56	***	0,56	***	0,58	***	Green votes = min
	0,53	***	0,53	***	0,54	***	Green votes = Q1
	0,49	***	0,49	***	0,50	***	Green votes = Q2
	0,45	***	0,44	***	0,46	***	Green votes = Q3
	0,31	***	0,29	***	0,31	***	Green votes = max

* p<0.1, ** p<0.05, *** p<0.01





3. European study on green diversification in regions

	LPM		Probit		Logit		Interaction Variables
Dirty	-0,016	***	0,000	*	0,000		Relatedness = min
	-0,012	***	0,001	*	0,000		Relatedness = Q1
	-0,007	***	0,003	*	0,002		Relatedness = Q2
	0,000		0,011	*	0,009		Relatedness = Q3
	0,027	**	0,106	*	0,093		Relatedness = max
Dirty	-0,006		0,000		0,001		Env (Reg) = min
	-0,006	**	0,000		0,000		Env (Reg) = Q1
	-0,006	**	0,000		0,000		Env (Reg) = Q2
	-0,006	**	0,000		0,000		Env (Reg) = Q3
	-0,006		-0,001		-0,002		Env (Reg) = max
Dirty	0,002		0,009	*	0,009	*	Env (Nat) = min
	-0,004		0,002	*	0,002		Env (Nat) = Q1
	-0,006	***	-0,001	*	-0,001		Env (Nat) = Q2
	-0,007	***	-0,002	*	-0,002		Env (Nat) = Q3
	-0,014	**	-0,008		-0,008		Env (Nat) = max
Dirty	-0,006	*	-0,001		-0,001		Green votes = min
	-0,006	**	0,000		0,000		Green votes = Q1
	-0,006	***	0,000		0,000		Green votes = Q2
	-0,005	*	0,000		0,000		Green votes = Q3
	-0,004		0,002		0,001		Green votes = max

* p<0.1, ** p<0.05, *** p<0.01





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Env. (Reg)		-0.00034 (0.00120)			0.00029 (0.00127)	-0.00115 (0.00151)			-0.00510*** (0.00171)
Env. (Nat)			-0.00316* (0.00174)		-0.00353* (0.00185)		0.00493** (0.00201)		0.00653*** (0.00223)
Green votes				0.00019 (0.00182)	0.00103 (0.00192)			0.00609*** (0.00206)	0.00631*** (0.00215)
GDP per capita	-0.00000 (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000** (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000** (0.00000)
R&D	-0.00155 (0.00121)	-0.00151 (0.00121)	-0.00129 (0.00121)	-0.00157 (0.00122)	-0.00139 (0.00122)	-0.00150 (0.00122)	-0.00133 (0.00118)	-0.00159 (0.00120)	-0.00144 (0.00119)
Human Capital	-0.00043 (0.00070)	-0.00040 (0.00070)	-0.00042 (0.00070)	-0.00043 (0.00070)	-0.00047 (0.00070)	-0.00040 (0.00070)	-0.00042 (0.00070)	-0.00043 (0.00070)	-0.00045 (0.00070)
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Unemployment rate	0.00020 (0.00046)	0.00016 (0.00047)	-0.00010 (0.00047)	0.00020 (0.00046)	-0.00010 (0.00048)	0.00016 (0.00047)	-0.00010 (0.00047)	0.00019 (0.00046)	-0.00012 (0.00048)
Population density	0.00003 (0.00004)	0.00003 (0.00004)	0.00004 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00004 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)
Relatedness * Env. (Reg)						0.00749 (0.01585)			0.04960*** (0.01816)
Relatedness * Env. (Nat)							-0.07480*** (0.01983)		-0.09285*** (0.02264)
Relatedness * Green votes								-0.05359*** (0.01601)	-0.04805*** (0.01628)
Constant	-0.01231 (0.04242)	-0.01269 (0.04241)	0.00157 (0.04241)	-0.01167 (0.04312)	0.00694 (0.04328)	-0.01267 (0.04241)	-0.00012 (0.04238)	-0.01151 (0.04310)	0.00496 (0.04326)
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES
Overall R-sqr	0.061	0.061	0.061	0.061	0.061	0.061	0.062	0.062	0.062
N	39318	39318	39318	39318	39318	39318	39318	39318	39318

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Dirty	-0.00610*** (0.00218)		-0.00576*** (0.00216)	-0.00568*** (0.00219)	-0.00566*** (0.00219)	-0.01672*** (0.00286)	-0.00569*** (0.00219)	-0.00526** (0.00223)	-0.00565** (0.00220)	-0.01114*** (0.00291)
Green		-0.00056 (0.00233)	0.00150 (0.00241)	0.00136 (0.00243)	-0.04001*** (0.00313)	0.00130 (0.00243)	0.00137 (0.00246)	0.00128 (0.00243)	0.00134 (0.00244)	-0.03865*** (0.00311)
Relatedness			0.49159*** (0.01637)	0.49146*** (0.01637)	0.16612*** (0.03027)	0.44135*** (0.02208)	0.49146*** (0.01637)	0.49147*** (0.01637)	0.49146*** (0.01637)	0.15244*** (0.03170)
Env. (Reg)				0.00056 (0.00128)	0.00055 (0.00128)	0.00057 (0.00128)	0.00060 (0.00160)	0.00059 (0.00128)	0.00056 (0.00128)	-0.00019 (0.00168)
Env. (Nat)				-0.00346* (0.00185)	-0.00347* (0.00185)	-0.00344* (0.00185)	-0.00346* (0.00185)	-0.00126 (0.00229)	-0.00347* (0.00186)	-0.00081 (0.00239)
Green votes				0.00101 (0.00192)	0.00099 (0.00192)	0.00100 (0.00192)	0.00101 (0.00192)	0.00077 (0.00192)	0.00084 (0.00218)	0.00028 (0.00220)
GDP per capita	-0.00000 (0.00000)	-0.00000 (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000* (0.00000)	-0.00000* (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)	-0.00000* (0.00000)	-0.00000 (0.00000)
R&D	-0.00205* (0.00117)	-0.00176 (0.00117)	-0.00184 (0.00121)	-0.00171 (0.00123)	-0.00167 (0.00124)	-0.00172 (0.00122)	-0.00172 (0.00124)	-0.00206* (0.00124)	-0.00168 (0.00124)	-0.00190 (0.00126)
Human Capital	-0.00064 (0.00071)	-0.00051 (0.00071)	-0.00055 (0.00070)	-0.00061 (0.00071)	-0.00061 (0.00071)	-0.00060 (0.00071)	-0.00061 (0.00071)	-0.00070 (0.00071)	-0.00060 (0.00071)	-0.00068 (0.00071)
Share elderly population	-0.11572 (0.18909)	-0.10347 (0.18984)	-0.08441 (0.18624)	-0.12918 (0.18672)	-0.12479 (0.18660)	-0.12722 (0.18671)	-0.12917 (0.18672)	-0.12893 (0.18675)	-0.12971 (0.18692)	-0.12507 (0.18682)
Unemployment rate	0.00010 (0.00046)	0.00026 (0.00047)	0.00006 (0.00046)	-0.00021 (0.00048)	-0.00023 (0.00048)	-0.00021 (0.00048)	-0.00021 (0.00048)	-0.00018 (0.00048)	-0.00021 (0.00048)	-0.00022 (0.00048)
Population density	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)	0.00003 (0.00004)
Green * Relatedness					0.37135*** (0.03528)					0.35500*** (0.03599)
Dirty * Relatedness						0.10110*** (0.03260)				0.05648* (0.03313)
Dirty * Env. (Reg)							-0.00008 (0.00199)			0.00152 (0.00225)
Dirty * Env. (Nat)								-0.00396 (0.00261)		-0.00486 (0.00296)
Dirty * Green votes									0.00038 (0.00212)	0.00097 (0.00220)
Constant	0.05115 (0.04318)	0.04941 (0.04347)	-0.01205 (0.04271)	0.00728 (0.04353)	0.04287 (0.04341)	0.01225 (0.04353)	0.00726 (0.04354)	0.00668 (0.04356)	0.00732 (0.04354)	0.04387 (0.04345)
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Region fixed effects	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Overall R-sqr	0.023	0.022	0.061	0.061	0.064	0.062	0.061	0.061	0.061	0.064
N	39318	39318	39318	39318	39318	39318	39318	39318	39318	39318

* p<0.1, ** p<0.05, *** p<0.01

