Evaluating heterogeneous effects of housing-sector-specific macroprudential policy tools on Belgian house price growth

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Our research focus

To which extent do Belgian housing-sector-specific macroprudential policies have **heterogeneous effects on local housing markets**? If present, which factors **drive** these heterogeneous effects?

- focus on heterogeneous effects on **house price growth** driven by local housing market characteristics and house financing constraints
- heterogeneity could blur aggregate effects of macroprudential policy while affecting relative local housing market conditions

Motivation - housing-sector-specific macroprudential policy

Since GFC $\rightarrow$ macroprudential policy to **diminish the spillovers of financial system distress to the real economy**

Housing-sector-specific macroprudential policies (e.g., risk weights for residential property, LTV, DSTI, DTI) have been **employed relatively often**

- Increase the resilience of banks
- Lower the vulnerability of lenders

$\rightarrow$ Effects on **house prices?**

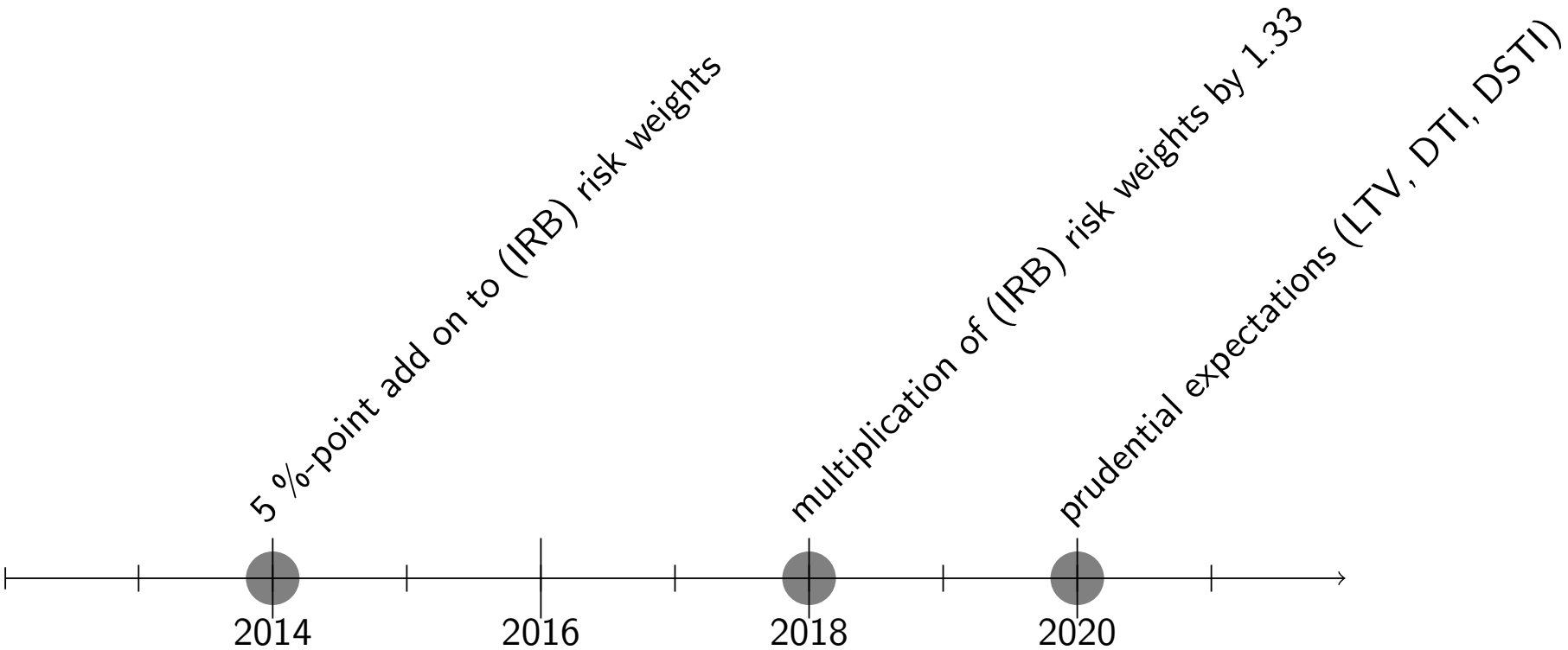
Motivation - literature

Heterogeneous effects on house prices?

- housing markets have a local character, driven by local supply and demand factors (Beraja et al. 2018; Case and Shiller 2003; Glaeser, Gyourkob, and Saiz 2008)
- macroprudential instruments target specific segments of the housing market

$\rightarrow$ municipality-level data: allow to account for sizeable local variation and focus explicitly on regional heterogeneity of the effects

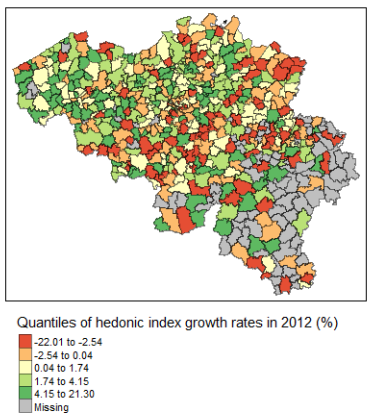
The Belgian experience: housing-sector specific macroprudential policy

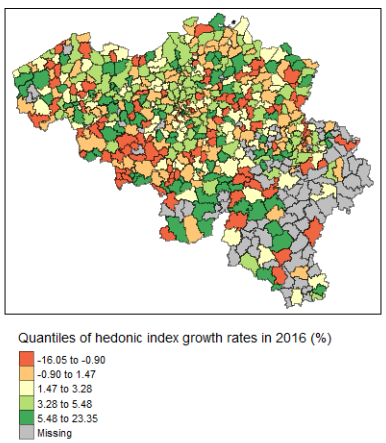


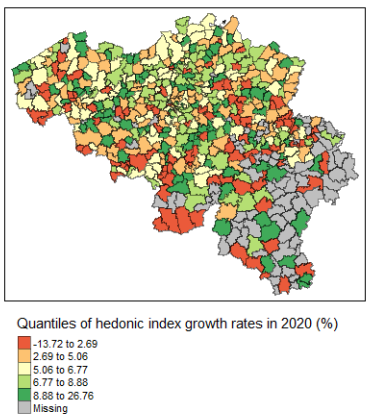
Measuring house price growth

Based on a **hedonic house price index** by Reusens, Vastmans, and Damen (2022)

- allows to control for compositional changes of the housing transactions over time ("price change of an identical dwelling")

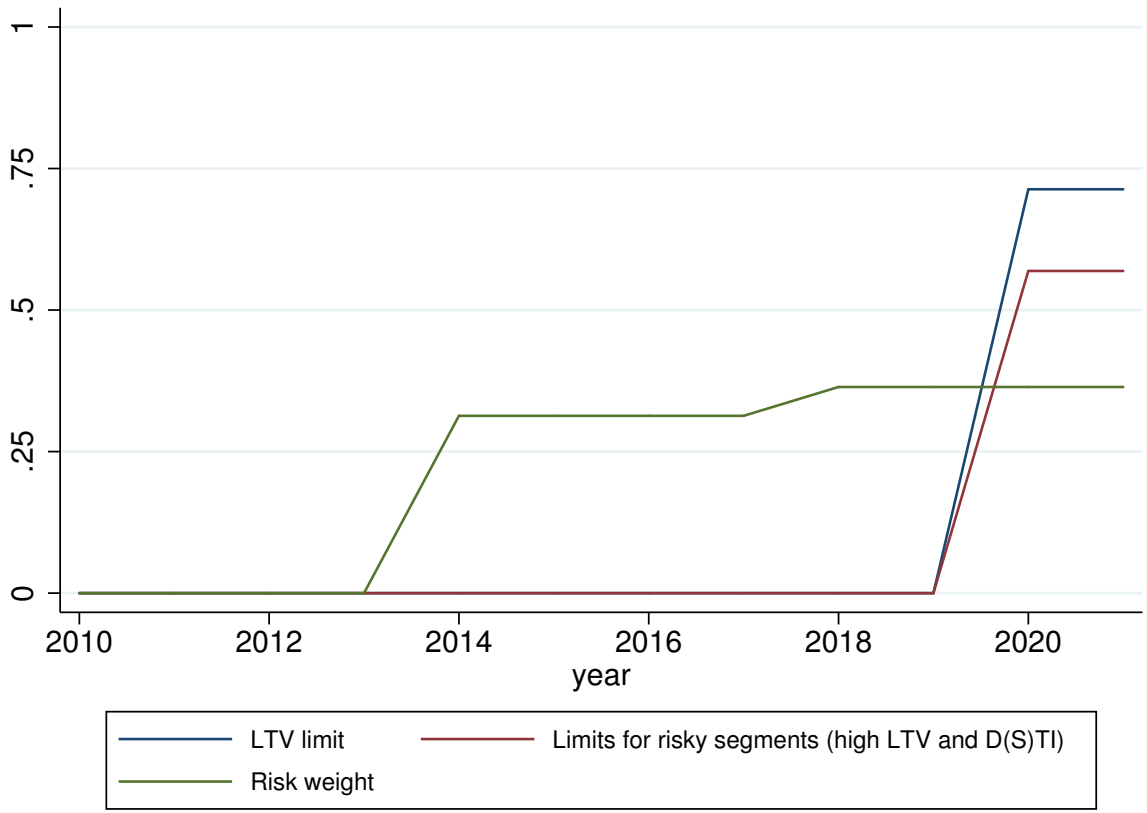






Macroprudential policy index

Intensity-based indices for housing-sector-specific macroprudential policy in Belgium Extra graph



Baseline model estimation: dynamic fixed effects model

$$y_{i,r,t} = \gamma y_{i,r,t-1} + \boldsymbol{\delta} \mathbf{x}_{i,r,t-1} + \beta(map_t * \mathbf{INT}) + \alpha_i + \theta_t + \varphi_{r,t} + \epsilon_{i,r,t}$$

- $y_{i,r,t}$: house price growth
- $\mathbf{x}_{i,r,t-1}$: explanatory variables at municipality level
- map_t: indicator of macroprudential policy
- **INT**: interaction term, see later
- $\varphi_{r,t}$: time*region fixed effects
- yearly data (2012-2020), 497 municipalities

Basic model estimation: drivers of local house price growth

$$y_{i,r,t} = \gamma y_{i,r,t-1} + \boldsymbol{\delta} \mathbf{x}_{i,r,t-1} + \beta(map_t * \mathbf{INT}) + \alpha_i + \theta_t + \varphi_{r,t} + \epsilon_{i,r,t}$$

- $\mathbf{x}_{i,r,t-1}$: drivers of local house price growth (in growth rates), based on the literature (Case and Shiller 2003; Favara and Imbs 2015; Glaeser et al. 2014) Data
  - ⊙ housing demand determinants (per capita income, employment, number of households)
  - ⊙ supply determinants (housing stock)

Basic model estimation: interaction term to investigate heterogeneous effects

Data

$$y_{i,r,t} = \gamma y_{i,r,t-1} + \boldsymbol{\delta} \mathbf{x}_{i,r,t-1} + \beta(map_t * \mathbf{INT}) + \alpha_i + \theta_t + \varphi_{r,t} + \epsilon_{i,r,t}$$

INT contains:

- $\mathbf{X}_{i,r,t=2010,2011}$: predetermined level variables
  - share of low-income inhabitants in 2010
  - share of overdue credits in 2010
  - share of young people (25-34) in 2010
  - share highly educated young people in 2011
  - share of single-person households in 2010
  - share of single-parent households in 2010
- $hotness_{i,r,t-1}$: lagged growth of housing transactions
- $debt_{i,r,t-1}$: lagged growth of mortgage credits

Results baseline model: interactions separately

Specification Dependent variable	(1) ΔHP	(2) ΔHP	(3) ΔHP	(4) ΔHP	(5) ΔHP	(7) ΔHP	(8) ΔHP
Share of low-income declarations (2010) * ΔMAP			-0.155***				
			(0.0318)				
Share of overdue credits (2010) * ΔMAP				-0.721***			
				(0.250)			
Share of young people (2010) * ΔMAP					-0.289***		
					(0.0868)		
Share of single-person households (2010) * ΔMAP						-0.0754**	
						(0.0316)	
Share of single-parent households (2010) * ΔMAP							-0.177*
							(0.118)
Lagged growth of housing transactions	-0.00192						
	(0.00311)						
Lagged growth of housing transactions * ΔMAP	-0.00298						
	(0.00832)						
Lagged growth of outstanding mortgages		0.215***					
		(0.0734)					
Lagged growth of outstanding mortgages * ΔMAP		0.0860					
		(0.150)					
Number of municipalities	497	497	497	497	497	497	497
Municipality fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region * time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged ΔHP	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Driving factors of ΔHP	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Results baseline model: interactions combined

Specification Dependent variable	(1) ΔHP	(2) ΔHP	(3) ΔHP	(4) ΔHP
Share of low-income declarations (2010) * ΔMAP			-0.137***	-0.134***
			(0.0373)	(0.0323)
Share of young people (2010) * ΔMAP		-0.230***	-0.232**	-0.236**
		(0.0820)	(0.110)	(0.108)
Share of highly-educated young people (2011) * ΔMAP		0.0558***		
		(0.0175)		
Share of single-person households (2010) * ΔMAP			0.00913	0.00615
			(0.0396)	(0.0364)
Share of single-parent households (2010) * ΔMAP			-0.0569	-0.0646
			(0.115)	(0.125)
Lagged growth of housing transactions	-0.00164			-0.00171
	(0.00324)			(0.00349)
Lagged growth of housing transactions * ΔMAP	-0.00245			-0.00160
	(0.00882)			(0.00855)
Lagged growth of outstanding mortgages	0.217***			0.217***
	(0.0740)			(0.0655)
Lagged growth of outstanding mortgages * ΔMAP	0.0837			0.0296
	(0.122)			(0.131)
Number of municipalities	497	497	497	497
Municipality fixed effects	Yes	Yes	Yes	Yes
Region * time FE	Yes	Yes	Yes	Yes
Lagged ΔHP	Yes	Yes	Yes	Yes
Driving factors of ΔHP	Yes	Yes	Yes	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Hot vs cold markets: Quantile Regressions

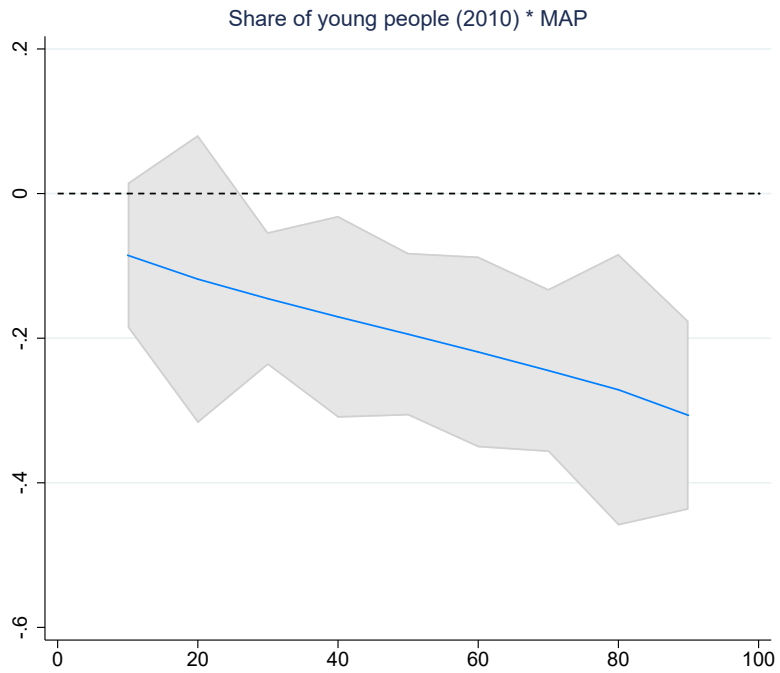
Quantile regressions calculate regressions coefficients β_τ for each τ-th quantile, relating a vector $X_{i,t}$ to the τ-th percentile of the **conditional distribution** of the endogenous variable $y_{i,t}$.

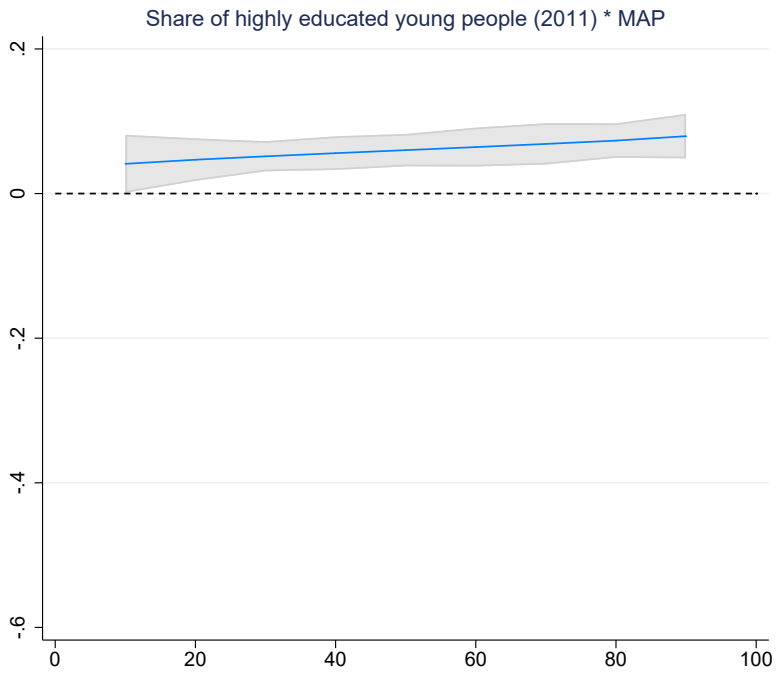
Our focus:
The distribution of growth of the hedonic house price index across the 497 Belgian municipalities, divided into deciles.

$\rightarrow$ left tail = cold housing market, right tail = hot housing market

$$y_{i,r,t,\tau} = \gamma_\tau y_{i,r,t-1} + \boldsymbol{\delta}_\tau \mathbf{x}_{i,r,t-1} + \boldsymbol{\beta}_\tau (map_t * \mathbf{INT}) + \alpha_{i,\tau} + \theta_{t,\tau} + \varphi_{r,t,\tau} + \epsilon_{i,r,t,\tau}$$

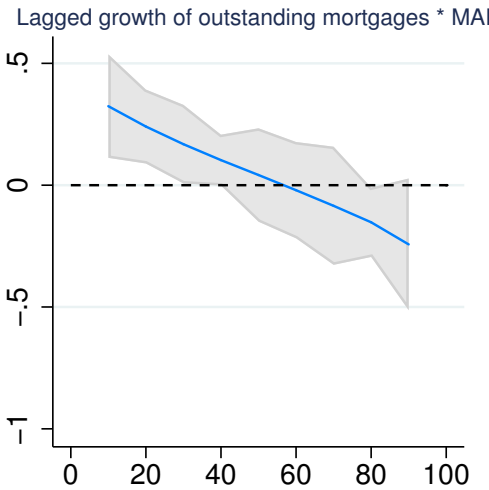
Results: combined interactions

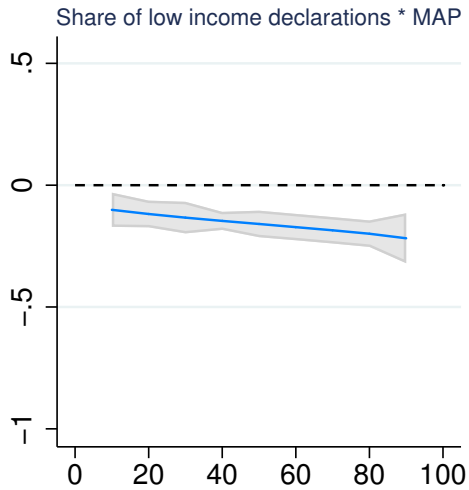


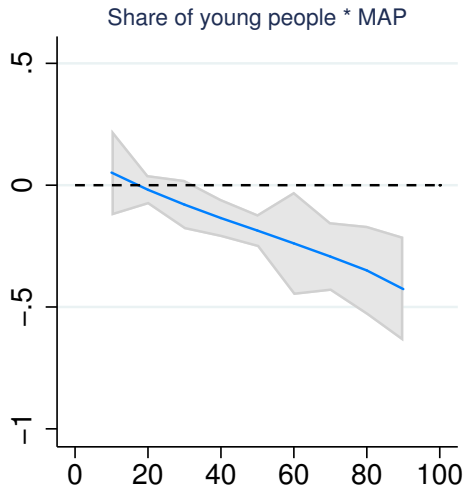


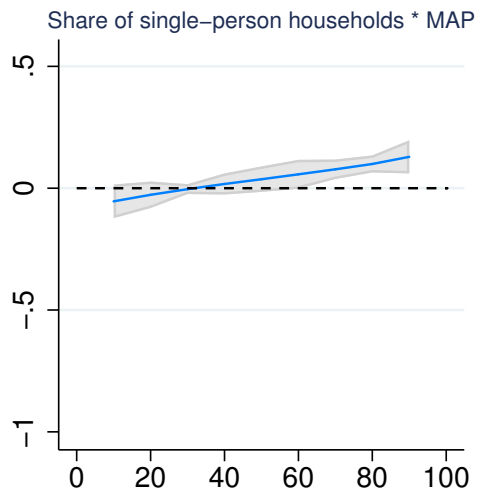
Results: combined interactions

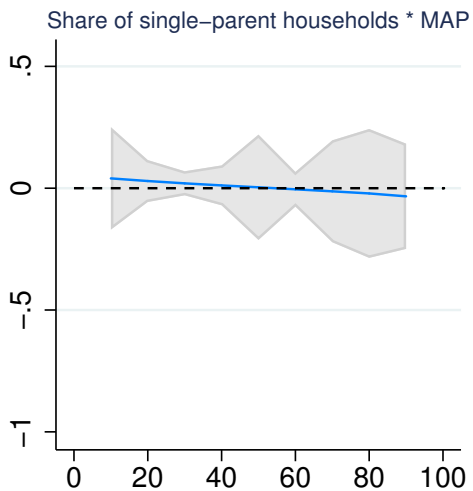
More results











Robustness checks

- different thresholds for data cleaning
- different proxies (housing supply, share of low income, MAP index)
- alternatives for jackknife corrections
- extensions: potentially heterogeneous effects of other common shocks to the Belgian economy (COVID-19, monetary policy) and analysis of the 'woonbonus' regulation

Conclusion

- **geographic heterogeneity of residents matters**: macroprudential tightening has a stronger dampening effect on house price growth in local housing markets with more constrained residents
- **heterogeneity in housing markets activity matters**: different effects in hot and cold housing markets

Conclusion

- **geographic heterogeneity of residents matters**: macroprudential tightening has a stronger dampening effect on house price growth in local housing markets with more constrained residents
- **heterogeneity in housing markets activity matters**: different effects in hot and cold housing markets
- housing-sector-specific macroprudential polices can be an adequate tool to stabilize hot local housing markets characterized by more financially constrained and high-risk residents
- potential distributional consequences
- future work: need for more granular data capturing borrower, house, and mortgage characteristics

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Macroprudential policy index

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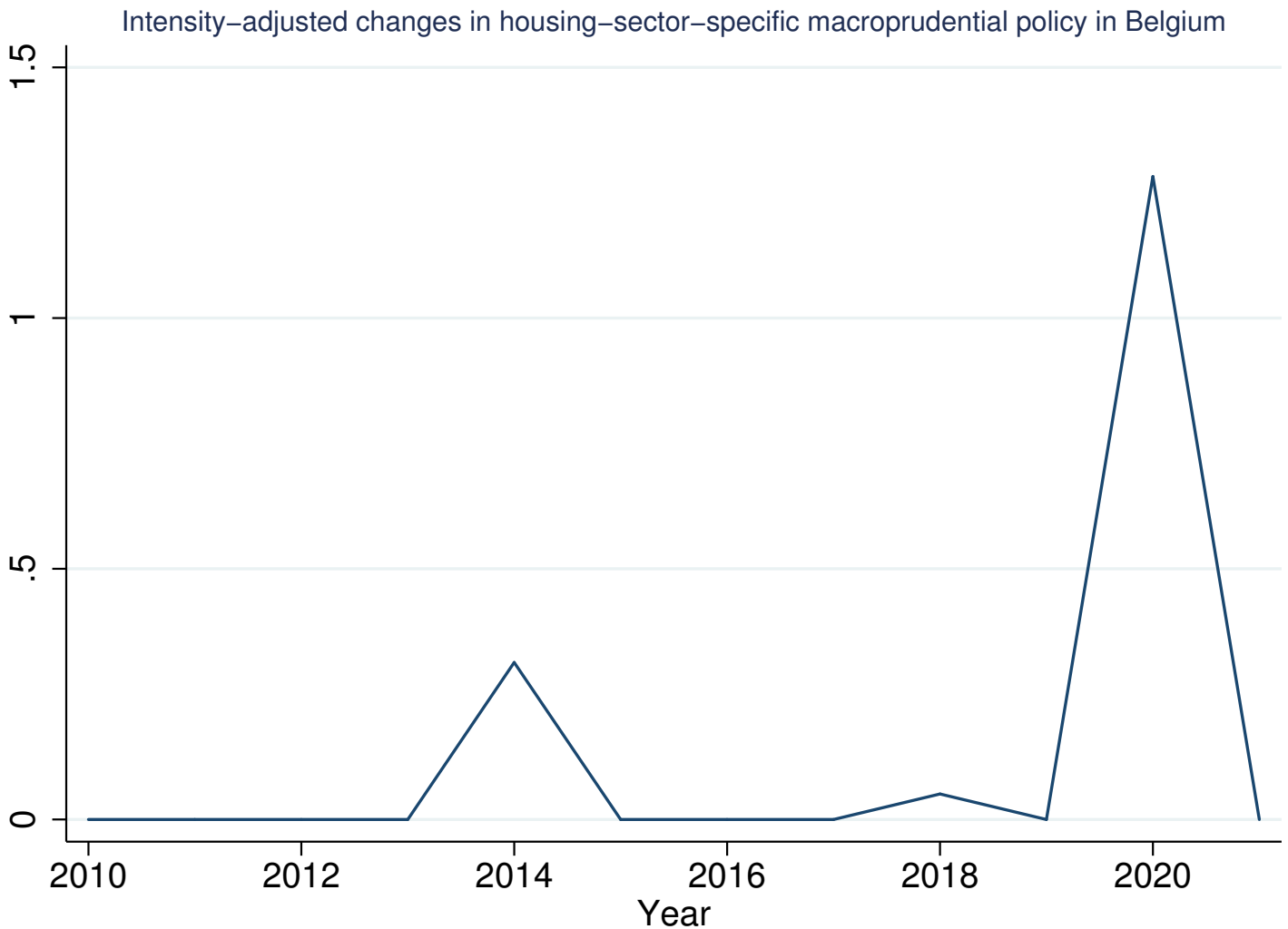

Basic model estimation: local drivers of house price growth

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Table: Descriptives of main driving forces of house price growth

	Mean	Std. Dev.	Min	Max	N
Median income growth	2.44	1.78	-7.78	19.38	4,644
Employment growth	0.64	1.30	-21.51	23.57	4,644
Growth housing stock	0.01	0.70	-4.24	6.02	5,676
Household growth	0.29	0.55	-8.21	4.11	5,664

Basic model estimation: local drivers of house price growth

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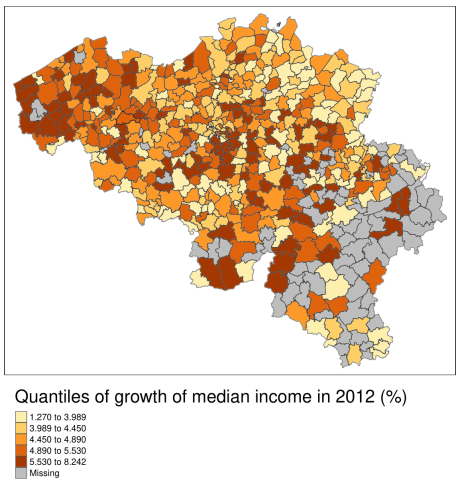
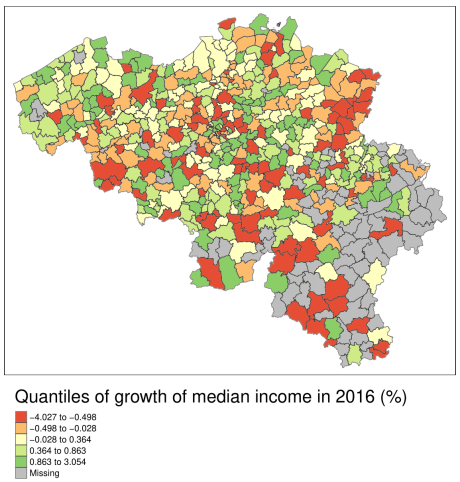
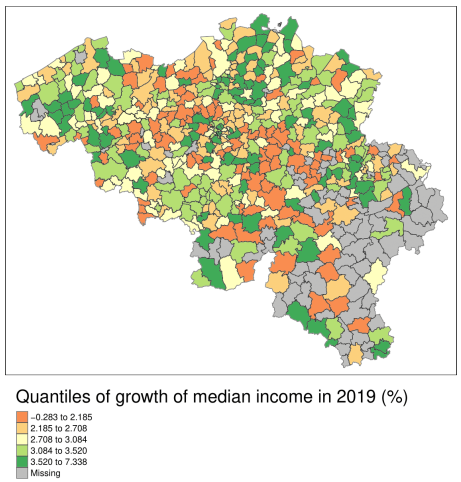
Median income growth across 497 Belgian municipalities for 2012, 2016, and 2019 (%)







Basic model estimation: local drivers of house price growth

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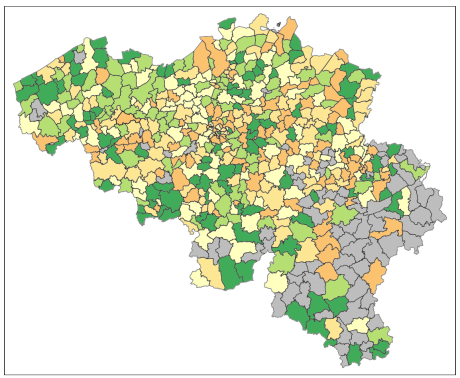
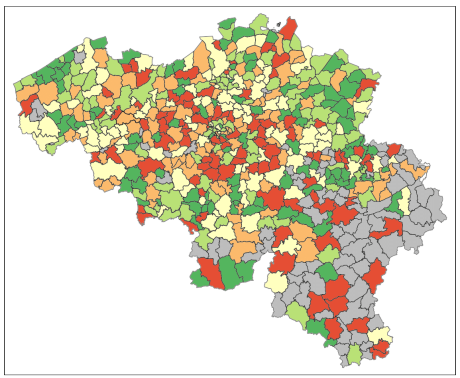
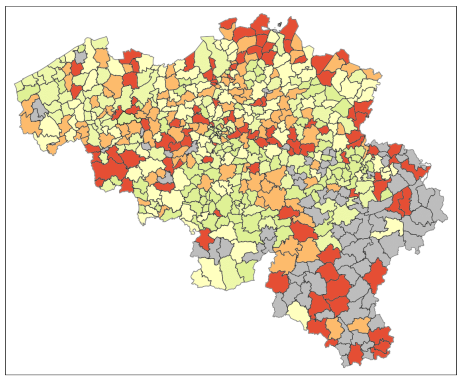
Employment growth across 497 Belgian municipalities for 2012, 2016, and 2019 (%)







Basic model estimation: local drivers of house price growth

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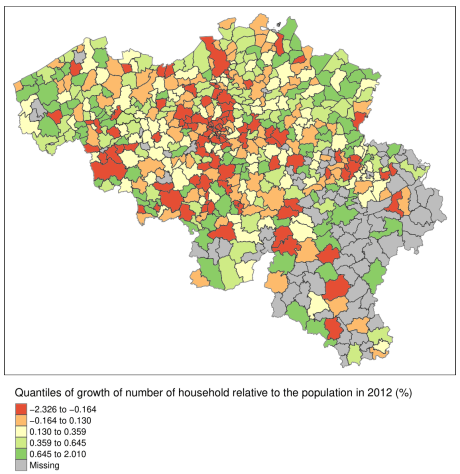
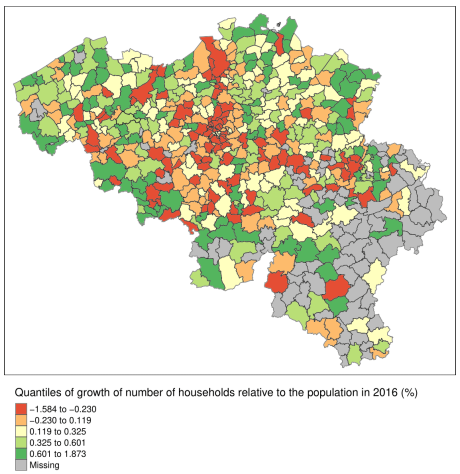
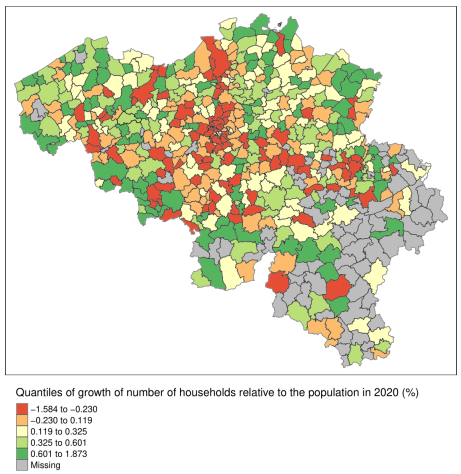
Growth of households across 497 Belgian municipalities for 2012, 2016, and 2020 (%)







Basic model estimation: local drivers of house price growth

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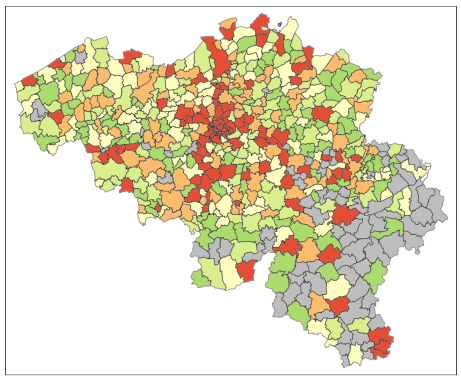
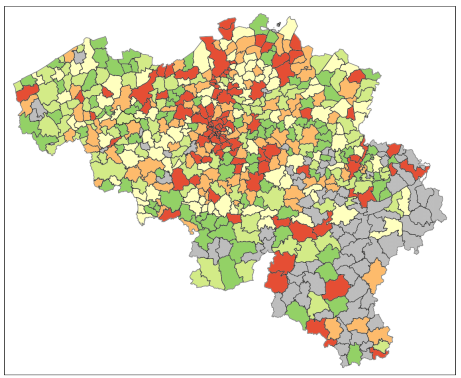
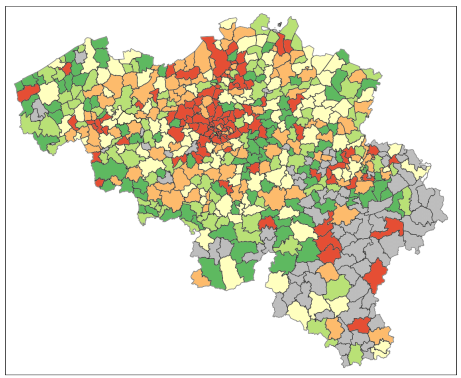
Growth of the housing stock across 497 Belgian municipalities for 2012, 2016, and 2020 (%)



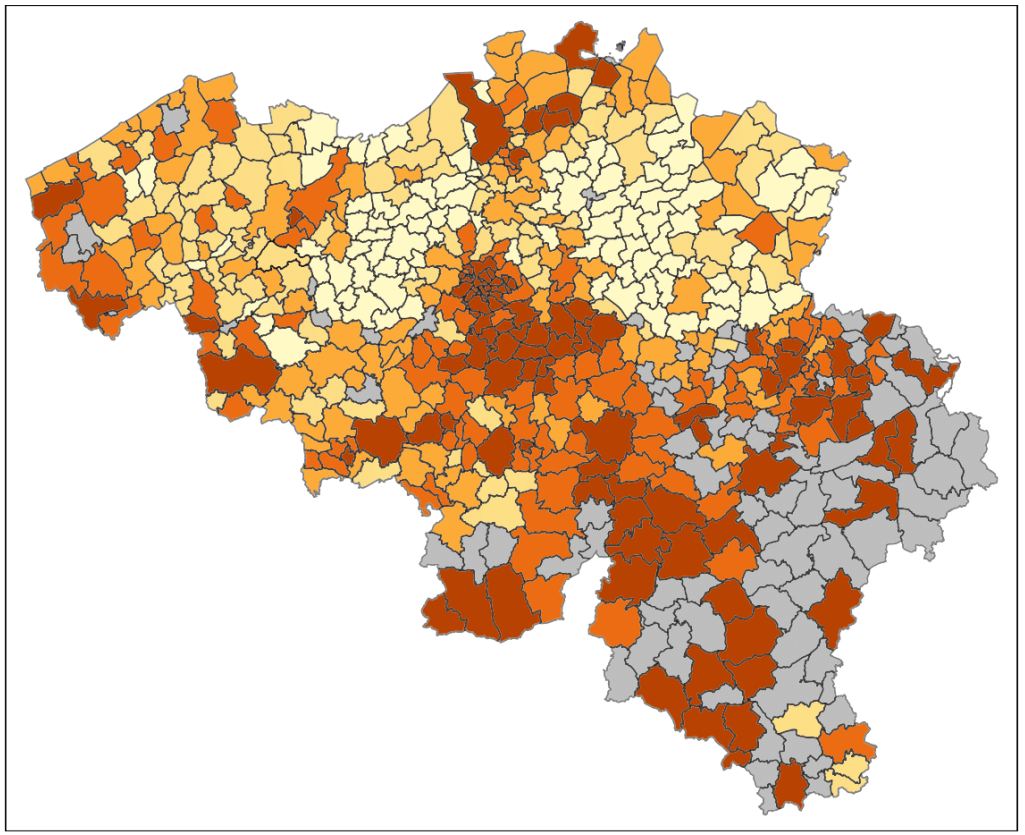




Basic model estimation: interactions

Go back

- cross-sectional variation: share of low income in 2010



Basic model estimation: interactions

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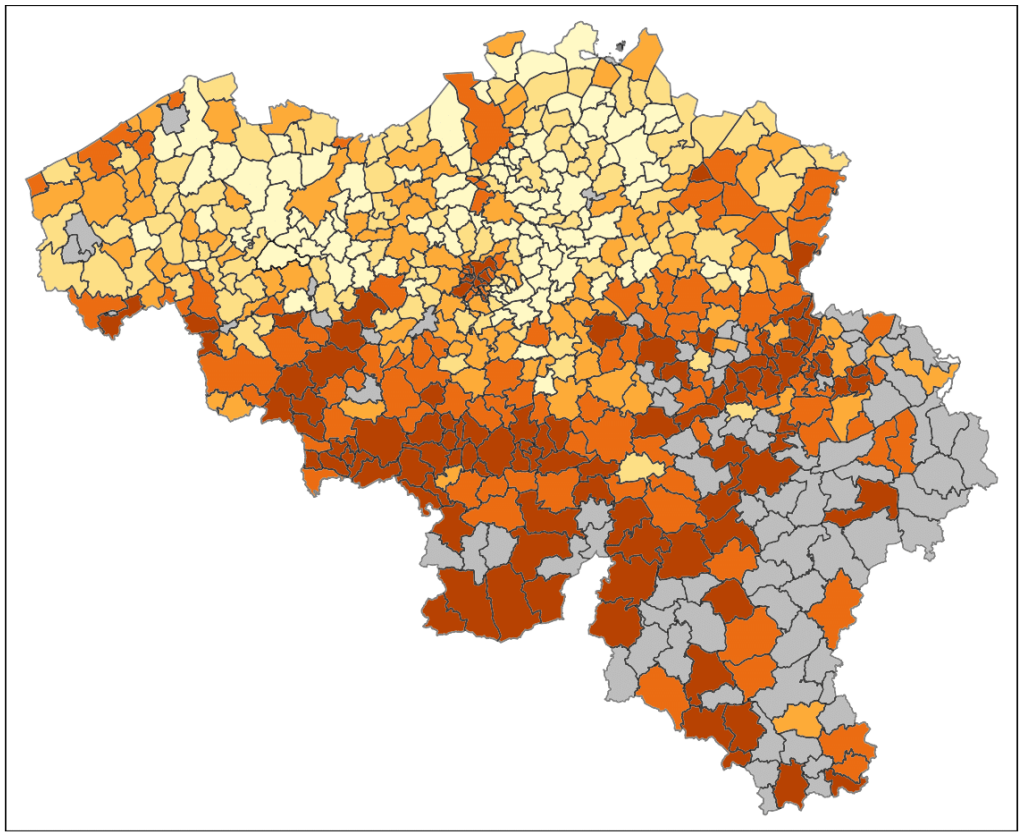
- cross-sectional variation: overdue mortgage credit in 2010



Basic model estimation: interactions

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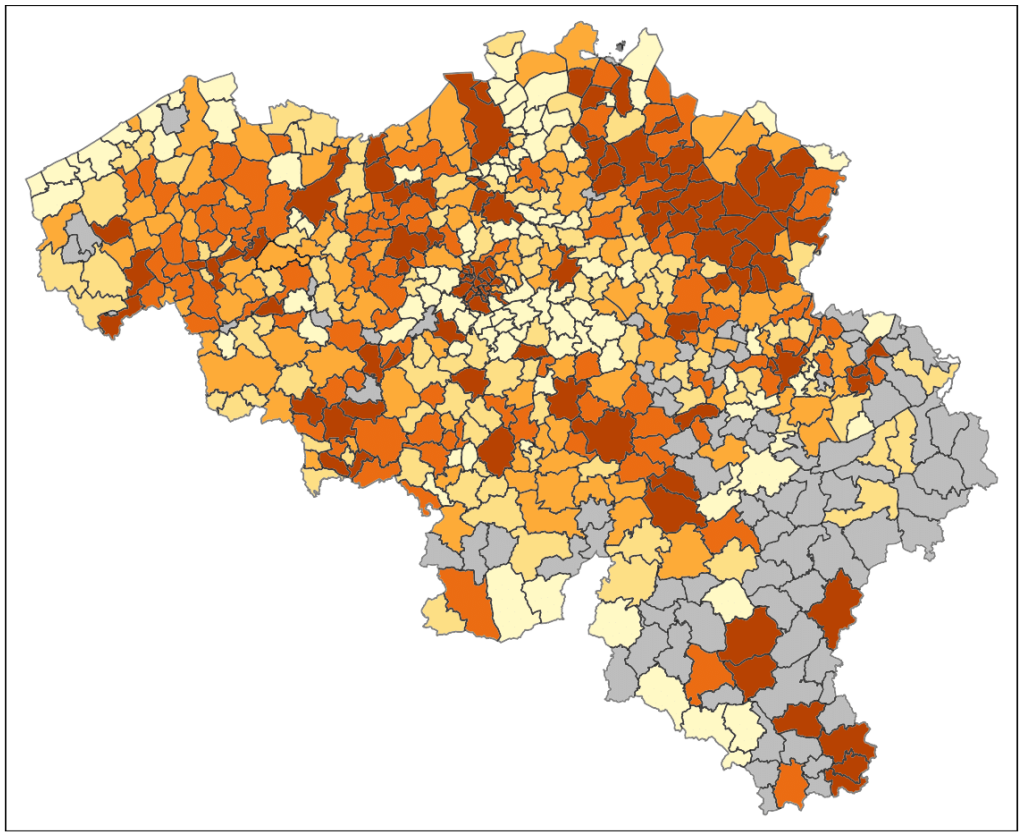
- cross-sectional variation: share of young people in 2010



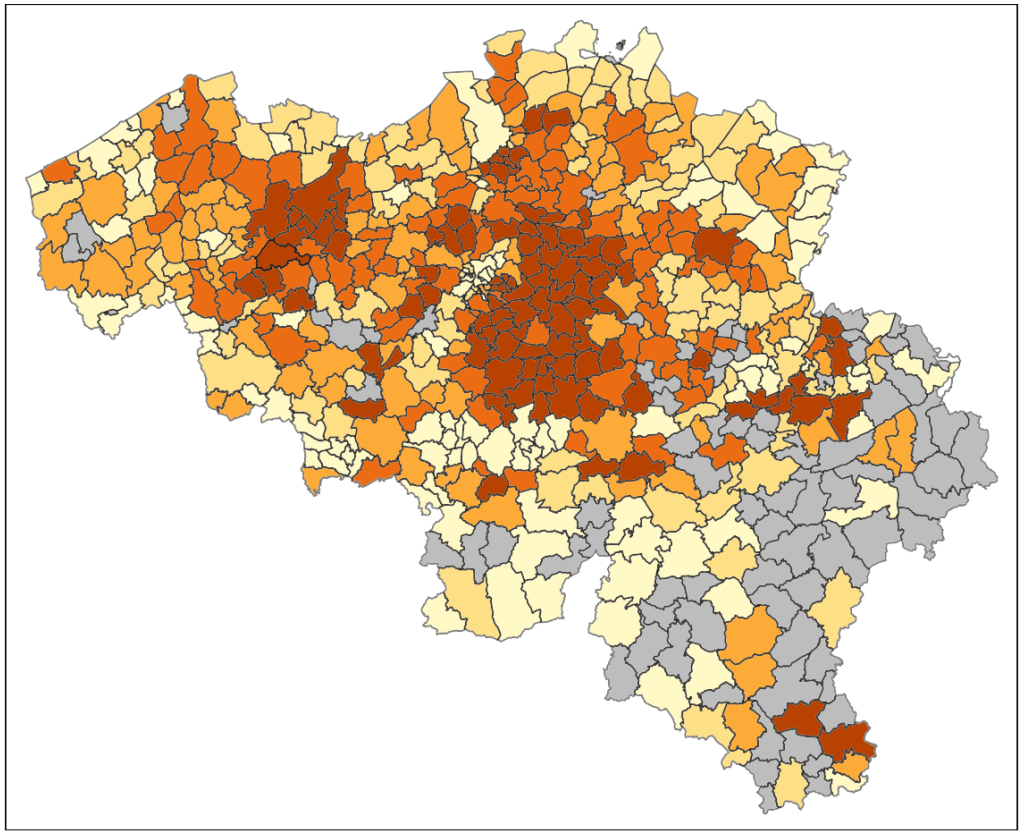
Quantiles of the share of young (25–34 year old) people in 2010 (%)

- 7.17 to 10.69
- 10.69 to 11.42
- 11.42 to 12.00
- 12.00 to 12.66
- 12.66 to 25.91
- Missing

Basic model estimation: interactions

Go back

- cross-sectional variation: share of highly educated 25-34 year olds in 2011



Basic model estimation: interactions

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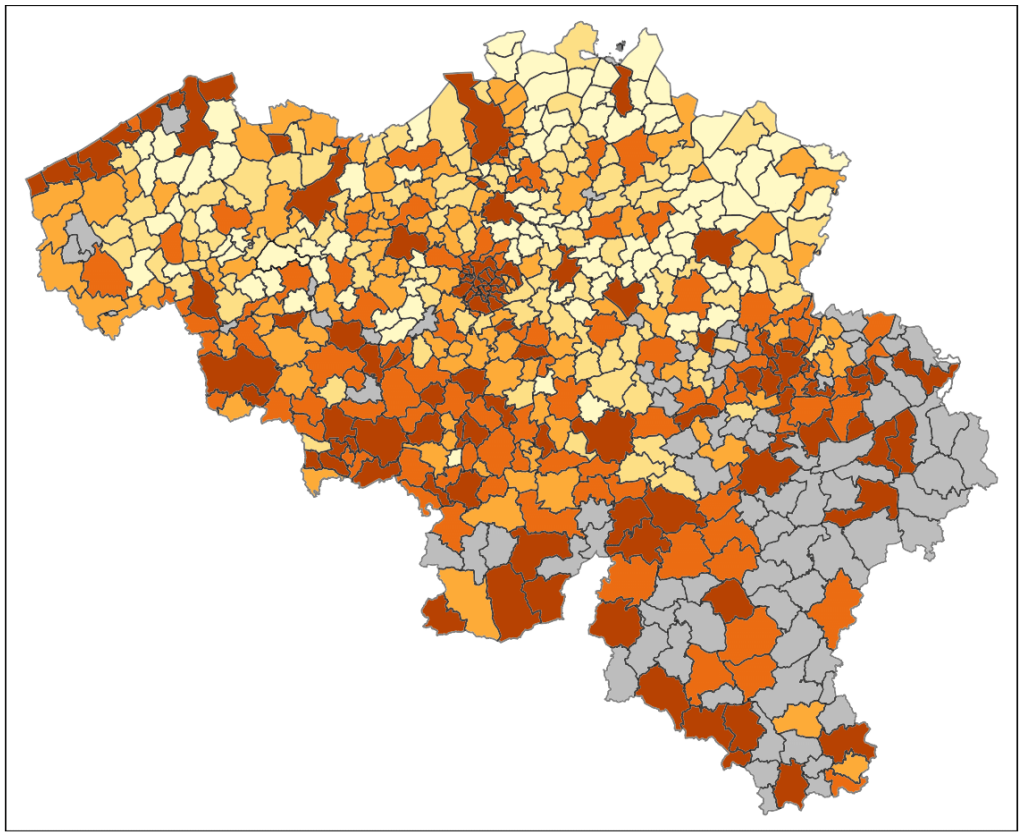
- cross-sectional variation: share of single households in 2010



Basic model estimation: interactions

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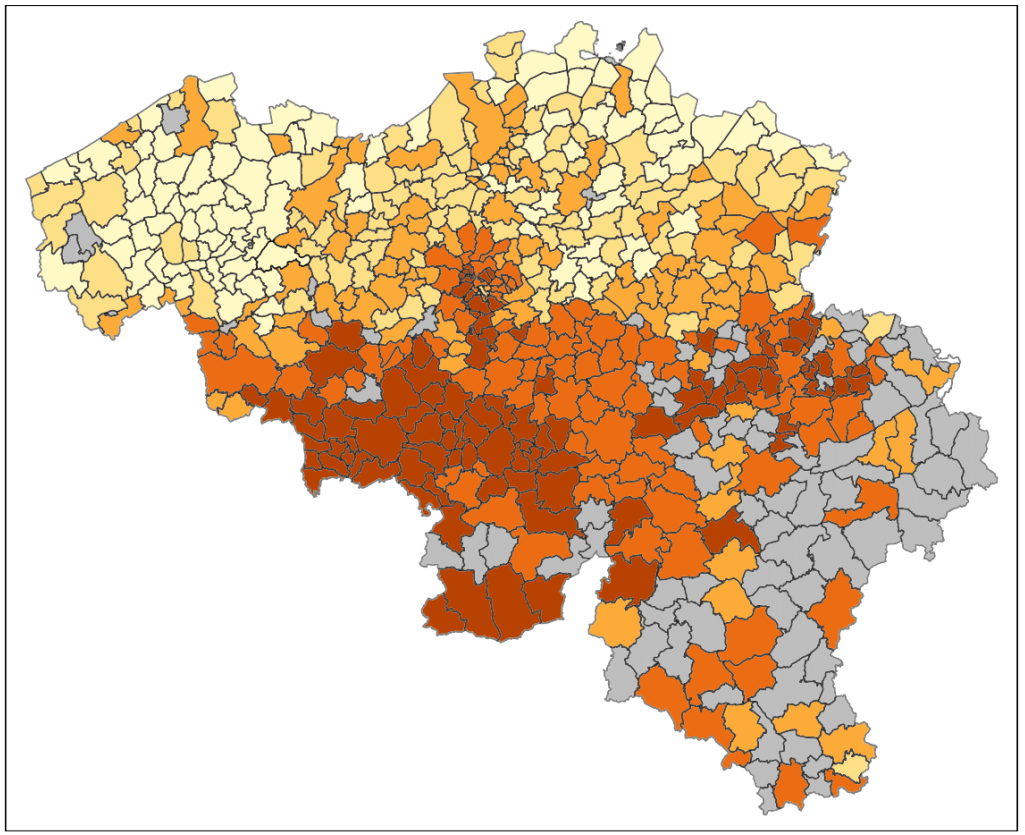
- cross-sectional variation: share of single parent households in 2010



Quantiles of the share of single parent households in 2010 (%)

- 5.53 to 7.35
- 7.35 to 8.24
- 8.24 to 9.66
- 9.66 to 11.65
- 11.65 to 17.47
- Missing

Basic model estimation: interactions

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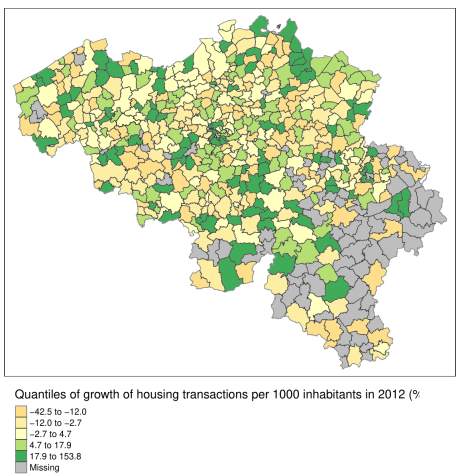
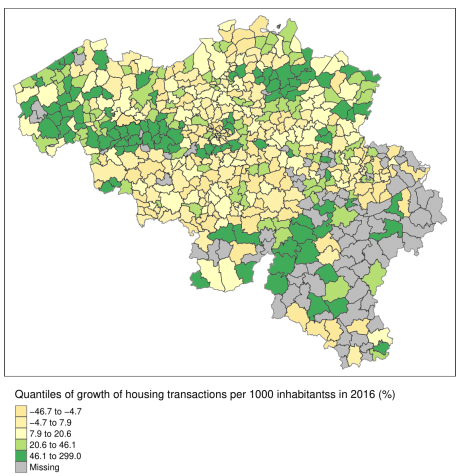
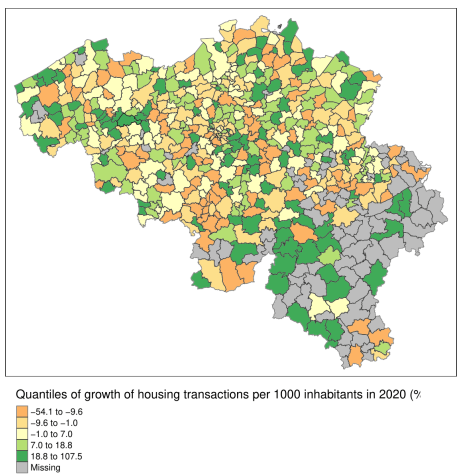
Growth of housing transactions across 497 Belgian municipalities for 2012, 2016, and 2020 (%)



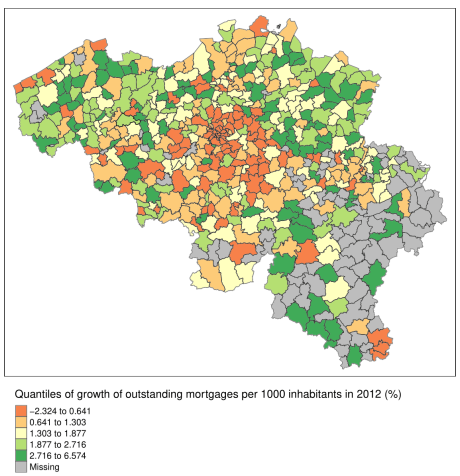


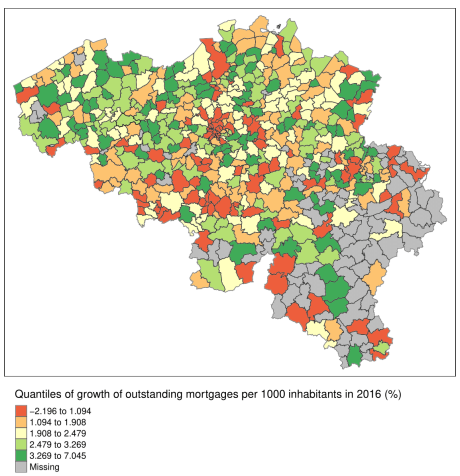


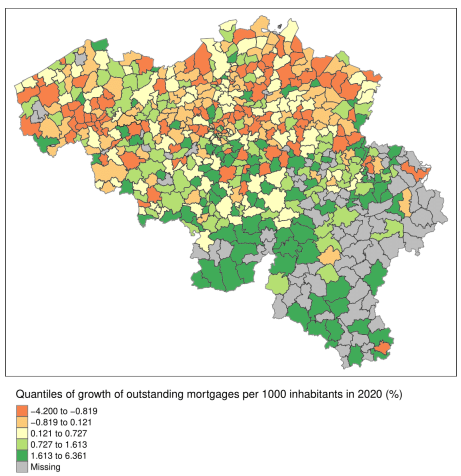
Basic model estimation: interactions

Go back

Growth of outstanding mortgages across 497 Belgian municipalities for 2012, 2016, and 2020 (%)







Extra results

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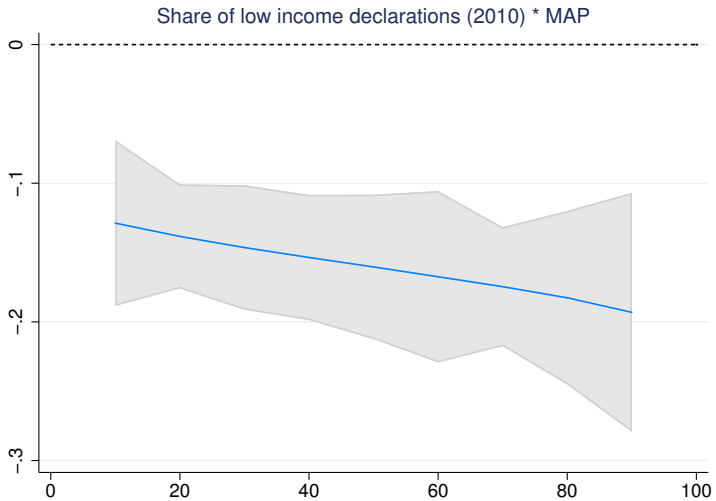

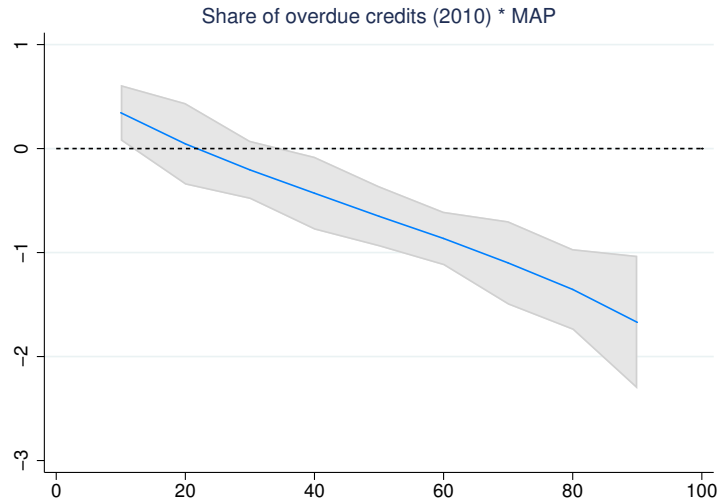

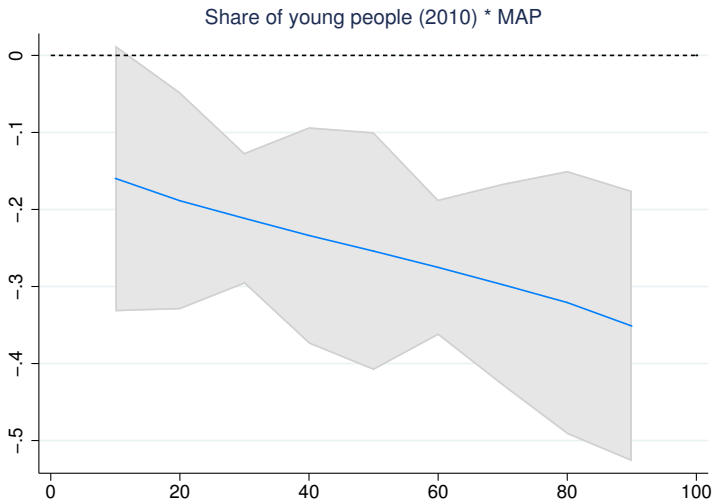

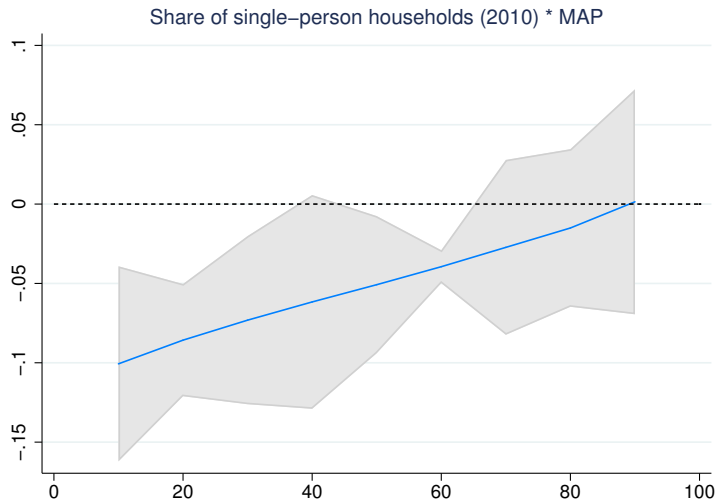

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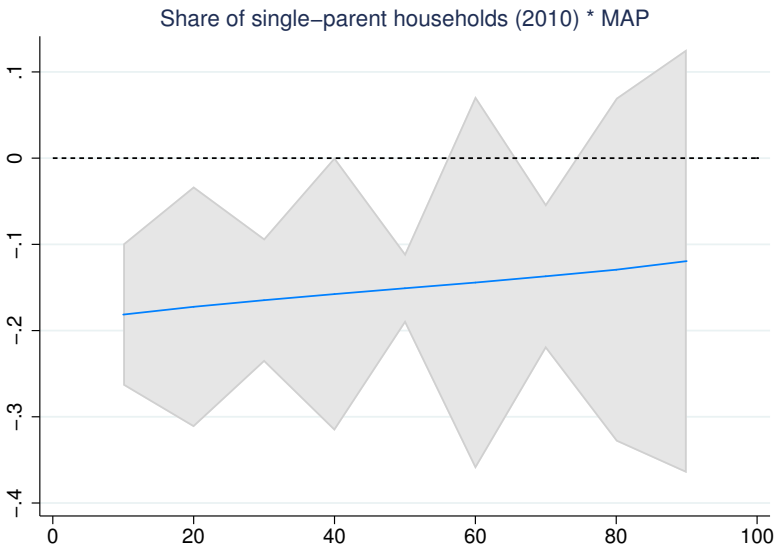

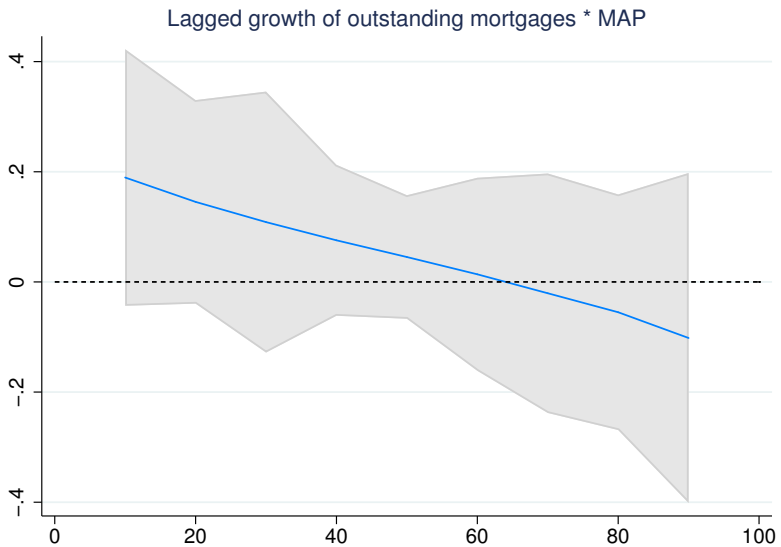

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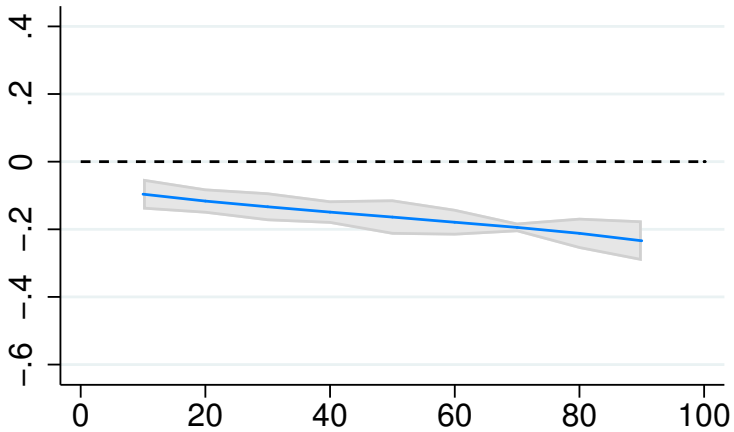
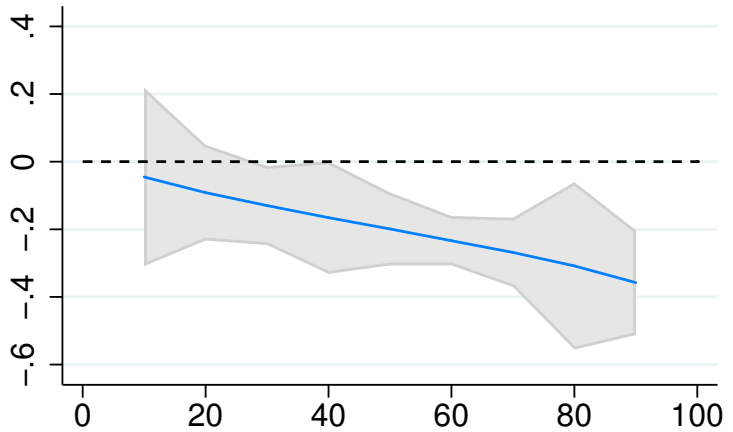
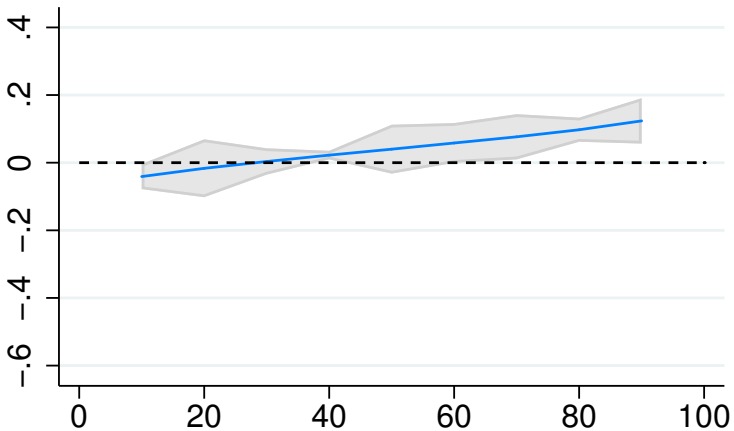
Share of low income declarations (2010) * MAP



Share of young people (2010) * MAP



Share of single−person households (2010) * MAP



Share of single−parent households (2010) * MAP