

On the Non-energy Drivers of Transport Demand: Estimating the Impact of Housing Prices

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Background and motivation

- Rapid increase of worldwide CO₂ emissions from transport:
 - 20% of the 2006 world CO₂ emissions;
 - This share is expected to grow at a rate of 1.7% by year.
- Energy economics literature that studies the formation of the transport-related fuel demand focuses on:
 - the impact of oil price;
 - the influence of income.

⇒ The role of the non-energy/spatial determinants of individuals' travel behavior has been largely neglected.

- Both Urban Economics and NEG literature have revealed mechanisms linking up commuting and the housing costs to explain households' location choice.



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Question and Objectives

- **RQ:** Can housing prices serve as policy variable to control transport-related energy use and CO₂ emissions? And, if so, to what extent ?
- **RO:**
 - To provide a comprehensive framework for the analysis of the relation between housing prices, gasoline prices and transport-related energy use;
 - To contribute to the evaluation of housing and spatial policy as relevant tools in the energy/climate debate.



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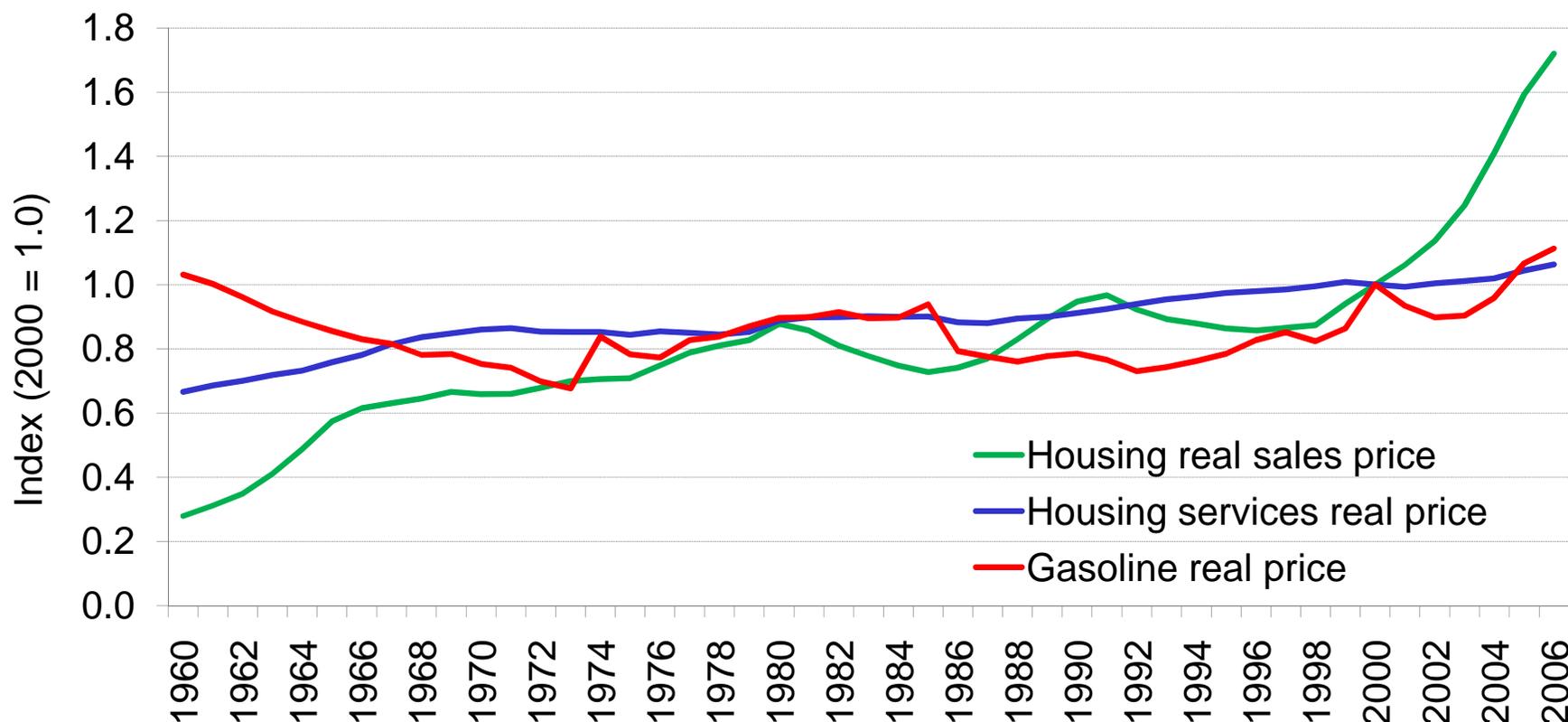
Method, Database and Variables

- Econometric longitudinal evaluation;
- **Data:** 1960 to 2006 French data;
- **Variables:**
 - Dependent variable: *Households' gasoline consumption per capita* (in cubic meter per capita);
 - Independent variables: *Gasoline Prices, Real disposable Income, Housing Prices.*



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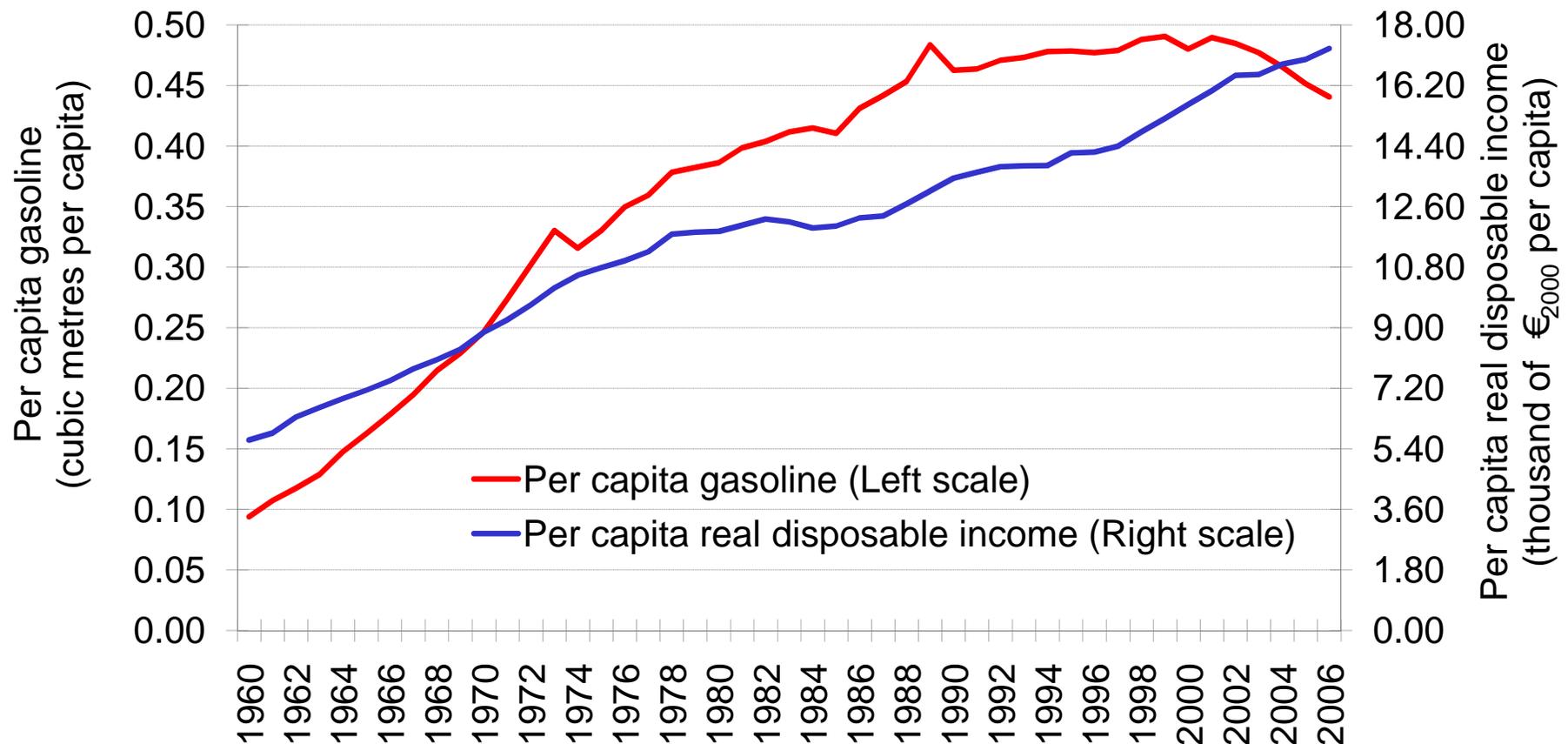
Descriptive of data: Housing and gasoline prices



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Descriptive of data: Gasoline demand and income



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THE IMPACT OF HOUSING PRICES ON GASOLINE DEMAND: *AN EMPIRICAL ANALYSIS*



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Two Models estimated

- Two separate models are developed:
 - Model 1 accounts for income and energy prices,
 - Model 2 introduces the price of housing as a third explanatory variable.
- Both models are controlled for time pathways and allow for short- and long-run elasticities.
- Both models are tested with cointegration method → non-spuriousness of the estimation



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Estimation results

	<i>Model 1</i>		<i>Model 2</i>	
	Short-run	Long-run	Short-run	Long-run
<i>Income Elasticity</i>	0.838***	1.238***	0.871***	1.002***
<i>Gasoline Price Elasticity</i>	-0.221***	-0.279***	-0.224***	-0.212***
<i>Housing Price Elasticity</i>	Not included	Not included	Not significant	0.650***

***: significant at 1% level



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CARBON TAX VERSUS HOUSING PRICES: *A SIMULATION EXERCISE*



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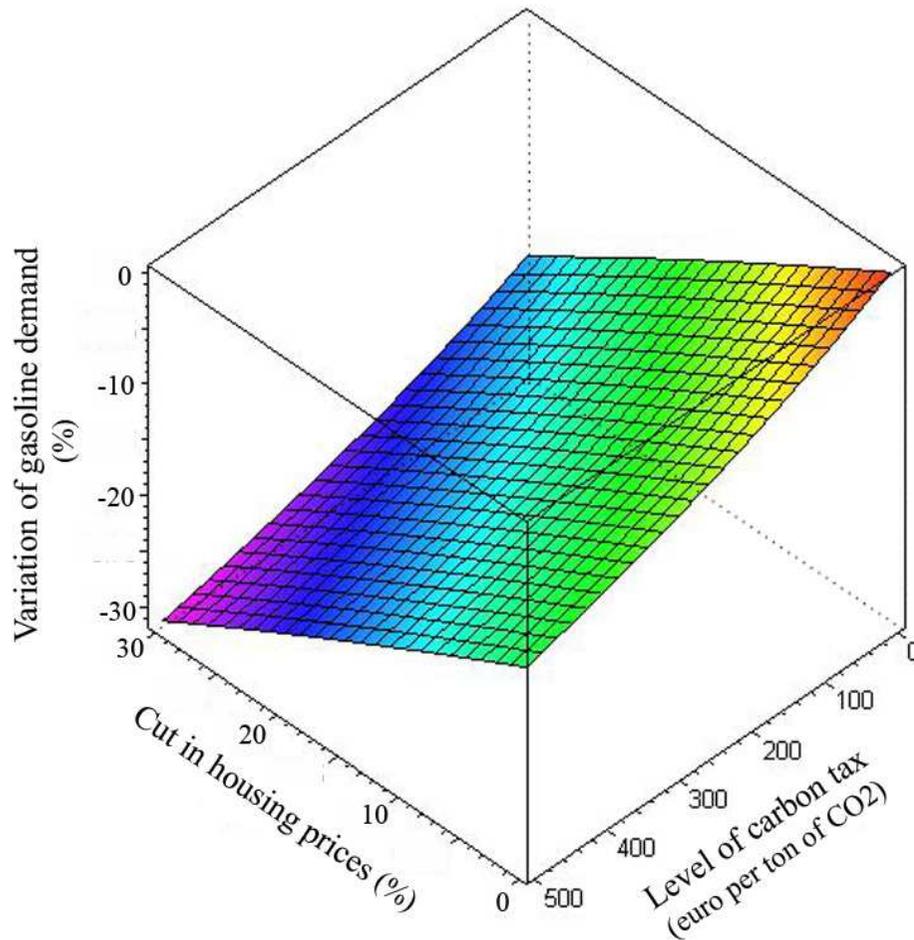
Simulation framework

- Previous analysis has shown that housing prices and spatial organization act as drivers of the gasoline consumption:
 - public policies could act on housing prices as a alternative complementary price mechanism to curb down the demand in transport-related fuel.
- The impact of a cap on the price of housing on individuals' transport behavior is tested:
 - transport-related energy demand is modeled using a Cobb-Douglas function including energy price, housing price and income;
 - elasticity coefficients estimated in the empirical analysis are used;
 - carbon tax and cap on housing prices are simulated.



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Simulation results (1)

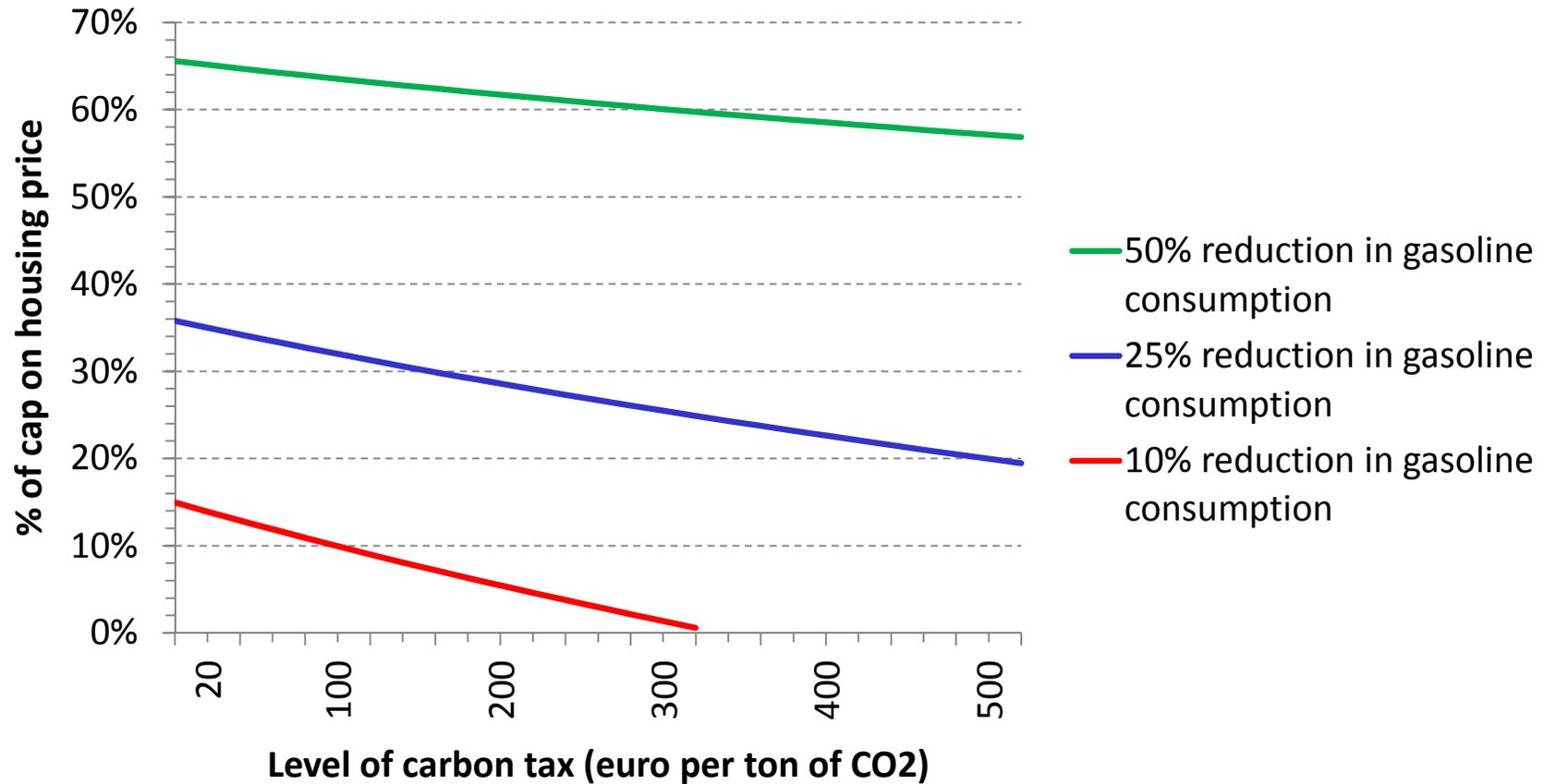


- Setting a tax of 500 euro per ton of CO₂ emitted contributes to lower the level motor fuel consumption by up to 13%;
- A 30% cut in housing price induces a 20% decrease of the transport-related energy demand;
- A coordinated policy intervention combining these two measures is found to yield 30% of energy savings.



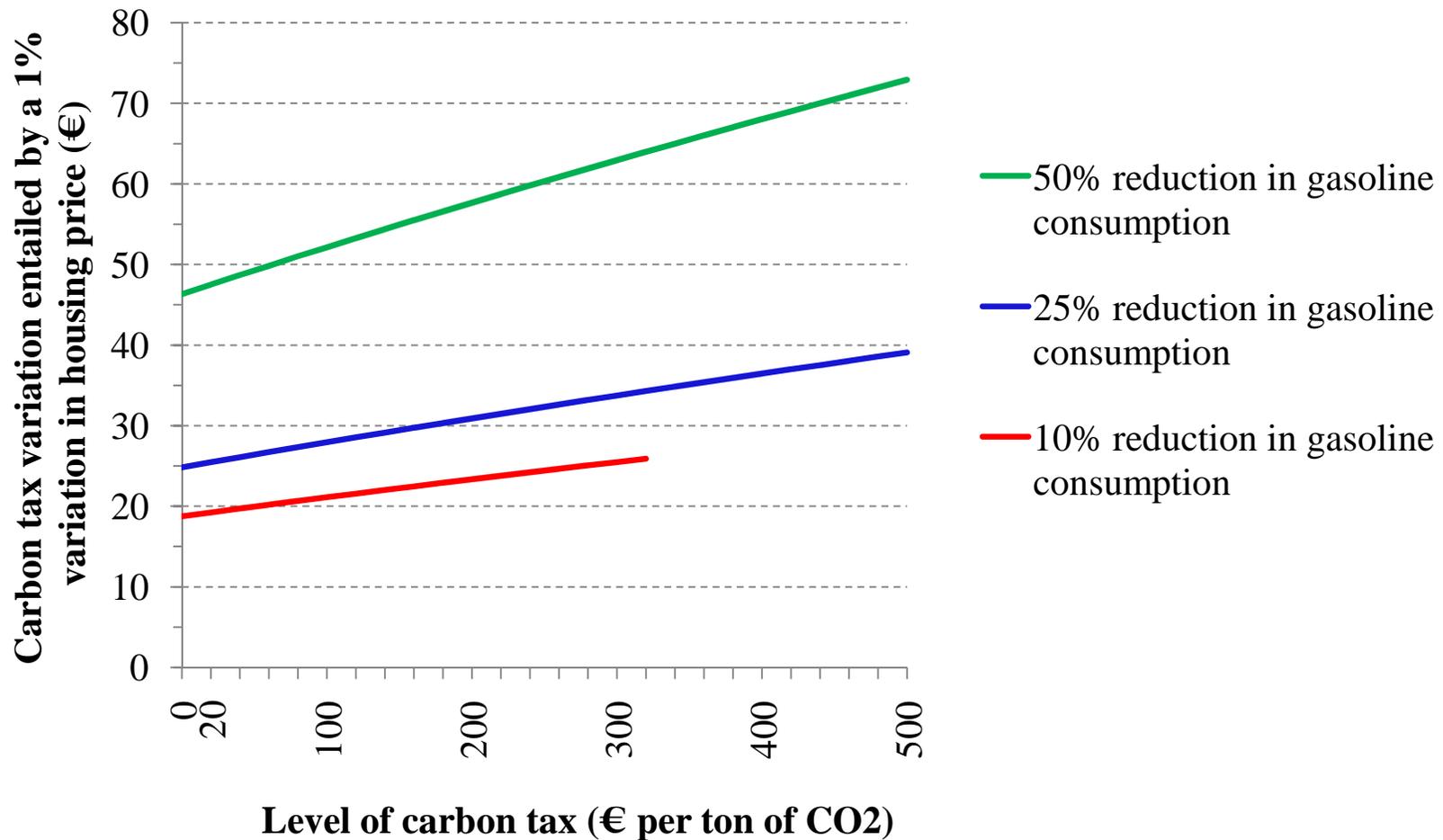
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Simulation results (2)



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Simulation results (3)



Conclusion

- Significantly positive impact of the spatial organization of economic activity on the formation of the energy demand through its action on the price of housing:
 - housing prices affect households' car dependency by modifying the location decisions of agents in the long term.
- Broadening the set of potentially effective energy policy tools:
 - In addition to carbon tax, spatial and transport-related regulations may turn out relevant to set in place efficient climate mitigation and energy sobriety strategies;
 - 30% of housing prices regulation versus 500 €/ton of CO₂ carbon tax : same order of magnitude of the effect on gasoline demand.



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QUESTIONS OR COMMENTS?



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