The Grand Paris Express is a transportation mega project which lies at the core of the transportation policy of the Paris region for the next few decades. The project consists in the construction and the extension of several automatic subway lines, with an estimated cost of approximately 23 billion €. While its major goal is to foster economic development through an efficient transportation network, it is also a cornerstone in the environmental transition strategy of the Paris region. Indeed, two other stated objectives of this project are to decrease the mode share of private cars, in particular for trips from suburbs to suburbs, and to curb urban sprawl.

Given the scarcity of public funds and the substantial cost of the project, the possibility of using land value capture to fund part of the project is being considered. It is based on the widespread belief that building a new transit line should raise real estate prices in the vicinity of the transit stations. Considering that the transport project is partly or entirely funded by public money, it makes sense that public authorities levy some tax on the underlying capital gains to recover part of the investment.

Withal, the economic literature casts some doubts on the premise of this reasoning. In their analysis on the link between aggregate transport costs and the total differential land rent, Arnott and Stiglitz (1981) argue that the latter is but a poor measurement of the benefits associated with a transportation project. This idea is corroborated by Wheaton (1974), who shows that in the case of a semi-closed city (fixed population with absentee landlords), a transport improvement flattens the housing price curve. Rents do increase in the suburbs, but they decrease near the city center through an equilibrium mechanism. A similar result is found by Arnott et al. (1986) in the case of a fully closed city (fixed population and public ownership of land). However, these works are based on the monocentric model, and no results are given in a polycentric context.

This work intends to shed some light on the impact of a transport improvement in a polycentric, more realistic, context. We first provide some insight using a simple model with two employment centers. Given the analytical complexity of the polycentric model, exemplified by Brueckner (1979) or Yinger (1992), we then turn to a novel land-use transport interaction model, NEDUM 2D, to study the impact of the Grand Paris project on real estate prices in an attempt to
corroborate the findings of our simple model. NEDUM 2D is based on a polycentric extension of standard monocentric model. It explains the spatial distribution of land and real estate values, dwelling size, population density and buildings heights and density. It is combined with a standard 4-step transportation model, with separate assignment modules for road traffic and public transit.

Using this model, we simulate the impact of the Grand Paris Express on land use as well as on transport in 2030 for different transport price and economic development scenarios. This allows us to estimate the impact of the transport project on housing prices, and thus the capacity to fund the project through land value capture.

References