

PAPER SUBMISSION

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1. Title of Paper	Modeling school choice in French Speaking Belgium using multi-agent models
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6. Three (3) Keyword Descriptors	School choice, prospective research, multi-agent models
a. MSC	
b. JEL	I21, I24
7. THE ABSTRACT	
a. Introduction, Background, and Objectives	The particularities of the educational system in French-speaking Belgium organised as a quasi-market (Le Grand, 1991; Maroy, 2006) foster socioeconomic segregation between schools. Several examples of segregation have been observed in numerous studies (Crahay, 2000; Demeuse & Baye, 2007) and synthesized by one of the authors of this paper (Demeuse & Friant, 2010). However, there is at this time little scientific evidence of the impact of school choice on social segregation between schools in French-speaking Belgium. Our objective in this paper is to build a model of school choice in French-speaking Belgium using multi-agent models to assess its impact on school segregation.
b. Theoretical or Conceptual Framework (if applicable)	School segregation is often studied from the point of view of post-structuralist theories (Allen, 2008) inspired by Bourdieu &

	<p>Passeron (1970). This approach can be useful but finds its limits in a system where individuals are free to choose (Allen, 2008). An economical approach that considers the individuals as rational actors (Boudon, 1979) is more suitable in this case but often assumes that individuals have more information than they actually have (Allen, 2008; Felouzis & Perroton, 2007). Our approach allows us to go over these difficulties by seeing the educational system as a complex system where a great number of agents interact and create emergent properties that, in turn, influence the agents (Gilbert & Troitzsch, 2005; Hourez, Friant, Soetewey & Demeuse, 2011).</p>
<p>c. Research Methods, Samples or Data Sources</p>	<p>Our method follows four steps:</p> <p>1° Describing the system We use anonymous census data at the pupil level (pupils entering primary and secondary education in September 2007). These data were given to the research team for a research project commissioned by the network of state-run schools (8% of all the pupils at the primary level; 23% of all the pupils at the secondary level). The variables of interest are:</p> <ul style="list-style-type: none"> - The pupil's socioeconomic index. - The pupil's area of residence. - The school attended by the pupil. - The school's average socioeconomic index. - The school's location. - The distance between the pupil's area of residence and the school attended. - The population density of the pupil's area of residence as a proxy for the density of educational provision in the area. <p>Statistical analyses are run on these data to describe the system.</p> <p>2° Building a multi-agent model A multi-agent system (Gilbert & Troitzsch, 2005) inspired by NetLogo (Wilensky, 1999) is programmed using the knowledge produced at step 1° (Hourez et al., 2011).</p> <p>3° Running simulations Several models of school choice are tested using the multi-agent system.</p> <p>4° Comparing actual and simulated data The outputs of the simulations are compared with actual data to determine the best-fit model. The levels of socioeconomic segregation produced by each model are compared.</p>
<p>d. Method of Analysis</p>	<p>Our objective at step 1° is to determine the scope of action of each pupil according to his/her SES and to the population density of his/her area of residence. Multiple regression is used on continuous data. Crosstabs are used on discretized data. Step 2° consists in programming a multi-agent system. At step 3° we test several models by applying differentiated values to several parameters (scope of action, pupils' preferences, schools' method of sorting, ...). At step 4°, we compare the school allocated to each pupil by the simulation to the school where he/she is actually registered, producing a level of explaining power for each model.</p>

<p>e. Findings</p>	<p>Results show that:</p> <ul style="list-style-type: none"> - The pupils' scope of action differs according to their SES and the population density of their area of residence. - The best-fit model is the "choice of the nearest school" model. This model explains 69% of school choice at the entry in primary education and 59% at the entry in secondary education. Models taking into account the schools' socioeconomic composition produces lower levels of correct allocation. - The levels of correct allocation differ according to the pupils' SES, with lower levels of correct allocation for pupils with a lower SES. - The segregation index (Gorard & Taylor, 2002) is higher with the "choice of the nearest school" model (S=0,60 in primary education and S=0,56 in secondary education) than observed on the actual data (S=0.49 in primary education and S=0,53 in secondary education).
<p>f. Conclusions, Scholarly or Scientific Significance, and Implications</p>	<p>The high levels of correct allocation obtained by the "choice of the nearest school" model show the major influence of geographical variables (Taylor & Gorard, 2001) to explain school choice in French-speaking Belgium. Moreover, the lower levels of correct allocation of low SES pupils show that some of them adopt a strategy of avoidance of the nearest "ghetto" school in order to attend a further, less disadvantaged school. These strategies are also reflected in the lower level of socioeconomic segregation between schools observed on the actual data than on the "choice of the nearest school" model output data. We must however remain cautious in the interpreting of these results given the several sources of potential biases (e.g.: the pupils' SES is area-based).</p>
<p>8. References</p>	<p>Allen, R. (2008). <i>Choice-Based Secondary School Admissions in England: Social Stratification and the Distribution of Educational Outcomes</i> (PhD Thesis in Education). Institute of Education, University of London, London. Retrieved 07-09-2011 from http://eprints.ioe.ac.uk/632/1/Allen_2008_thesis_with_corrections.pdf</p> <p>Boudon, R. (1979). <i>L'inégalité des chances. La mobilité sociale dans les sociétés industrielles</i>. Paris : Armand Colin.</p> <p>Bourdieu, P., & Passeron, J. C. (1970). <i>La reproduction. Eléments pour une théorie du système d'enseignement</i>. Paris: Editions de Minuit.</p> <p>Crahay, M. (2000). <i>L'école peut-elle être juste et efficace? De l'égalité des chances à l'égalité des acquis</i>. Brussels: De Boeck.</p> <p>Demeuse, M., & Baye, A. (2007). Measuring and Comparing the Equity of Education Systems in Europe. In N.C. Soguel, & P. Jaccard (Eds), <i>Governance and</i></p>

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