Indicative Solution of the Planning New Towns case (EN)

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The long term planning of new towns case is about increased urbanization through so-called 'New Towns'. The concept of 'New Towns' relates to more or less independent new towns at large distance from existing cities. There are hundreds of new towns around the world and many new ones are under construction (especially in Asia and Africa). Although the number of inhabitants of these cities varies from less than 50000 to more than a million, and although they are very different in objective function and design, there are interesting dynamic parallels and the same 'mistakes' made over and over again. This case is directly based on a modified version of Richardson's URBAN1 model[1] and indirectly on other SD work on urban dynamics (Forrester 1969) [ADD REFERENCES].
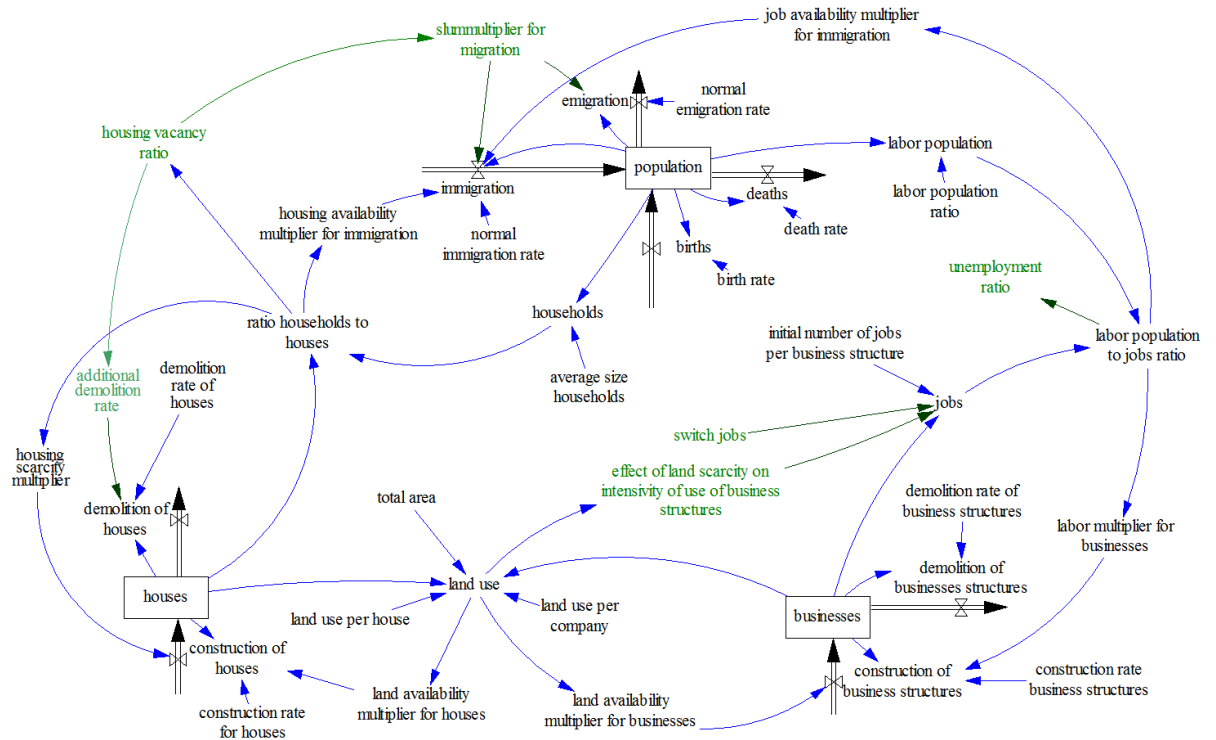

Figure 1: Stock-Flow diagram of the full New Towns model (based on Richardson)

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[1]URBAN1 is available at http://www.albany.edu/faculty/gpr/PAD624/urban1.mdl.

First, students need to model and connect submodels regarding population, housing, and businesses (see Figure 1). They are asked to simulate the model over a time horizon of 200 years, make graphs of the dynamics (Figure 2(a)), and identify problems related to the dynamics of new towns. Then they have to make a strongly aggregated causal loop diagram of this system model and use it to explain the model behavior (see Figure 2(g)). Subsequently, students have to add and test the effect of (i) a slum multiplier (ie the impact of high housing vacancy ratios on migration) and increased demolition in case of high housing vacancy ratios, and (ii) the effect of land scarcity on the intensity of use of business structures (ie more jobs per acre). Comparing graphs of the resulting dynamics (see Figures 2(b-f)), students need to realize that these effects and policies positively affect the housing vacancy ratio, but do not solve the problem of high unemployment ratios. After briefly validating the model, and performing sensitivity analyses in view of resolving remaining problems, students need to suggest (and model) policies to solve them.

References

Forrester, J. (1969). *Urban Dynamics*. Cambridge, MA: Pegasus Communications. 1

(a) New town start

(b) Population

(c) Houses

(d) Businesses

(e) Housing Vacancy Ratio

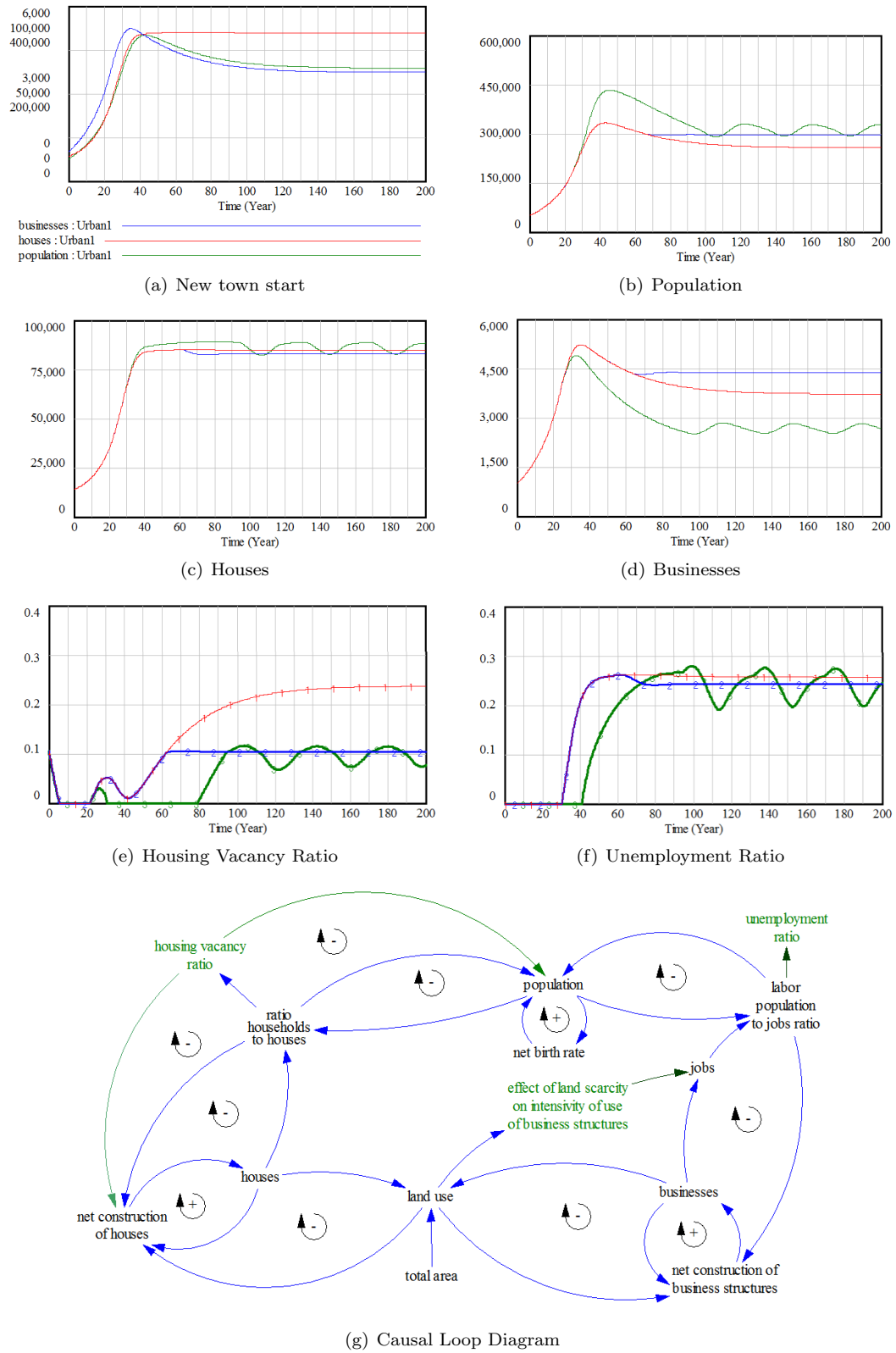(f) Unemployment Ratio

(g) Causal Loop Diagram

Figure 2: New towns planning: Initial dynamics ((a) and red in (b)-(f)), extension 1 (slum multiplier on migration and additional demolition – blue in (b)-(f)), extension 2 (extension 1 with endogenous effect of land scarcity on intensity of use of business structures – green in (b)-(f)), and an aggregated CLD