A

Model Documentation

This appendix shows the model documentation of the Dutch Social Housing Model. This is accomplished in this section of the report by first providing an overview of how the various sub-models are illustrated in Vensim in order to show the model structure of the developed SD model (see section A1). Subsequently, the implementation of the various variables in Vensim is discussed in greater detail in section A2.

A.1 Model Structure

Three sub-models, namely the population sub-model, the housing market sub-model, and the financial sub-model, can be found when analyzing the structure of the Dutch Social Housing Model. First, the population sub-model sheds light on how much housing is needed in the Haaglanden area. Furthermore, the housing market sub-model shows the supply of social housing in Haaglanden at any given time. The quality of these residences is also revealed by the average condition score of the homes in this sub-model. The financial sub-model ultimately outlines how the homes that are added to or subtracted from the current home stock will be financed as well as what financial repercussions these changes have for housing associations.

In this section of the appendix, screenshots of the many model components will be used to give an overview of the elements that make up the structure of the many sub-models. This is accomplished by showing the model components for each sub-model below. First of all, the variables enclosed in yellow boxes correspond to the various KPIs investigated in this study, while the variables enclosed in blue boxes correspond to the switches used to carry out the extreme condition tests (consult Appendix B.4). Additionally, the red parameters show the uncertain parameters examined in this study, while the green parameters show the variables that were adjusted in this model to shed light on how the investigated policies may effect the social housing system. Ultimately, in order to improve the SD model's clarity, the gey variables – also referred to as "shaduw variables" – are the variables that are derived from other model elements.

A.1.1 Population Sub-model

In this section, the model components of the population sub-model are presented. In particular, this sub-model is divided into the population components (see Figure A.1) and the household components (see Figure A.2). The Haaglanden region's population growth can be seen using the population components, and the development of households in this region is shown by the household component, allowing for the estimation of housing demand from low- and middle-low-income households.

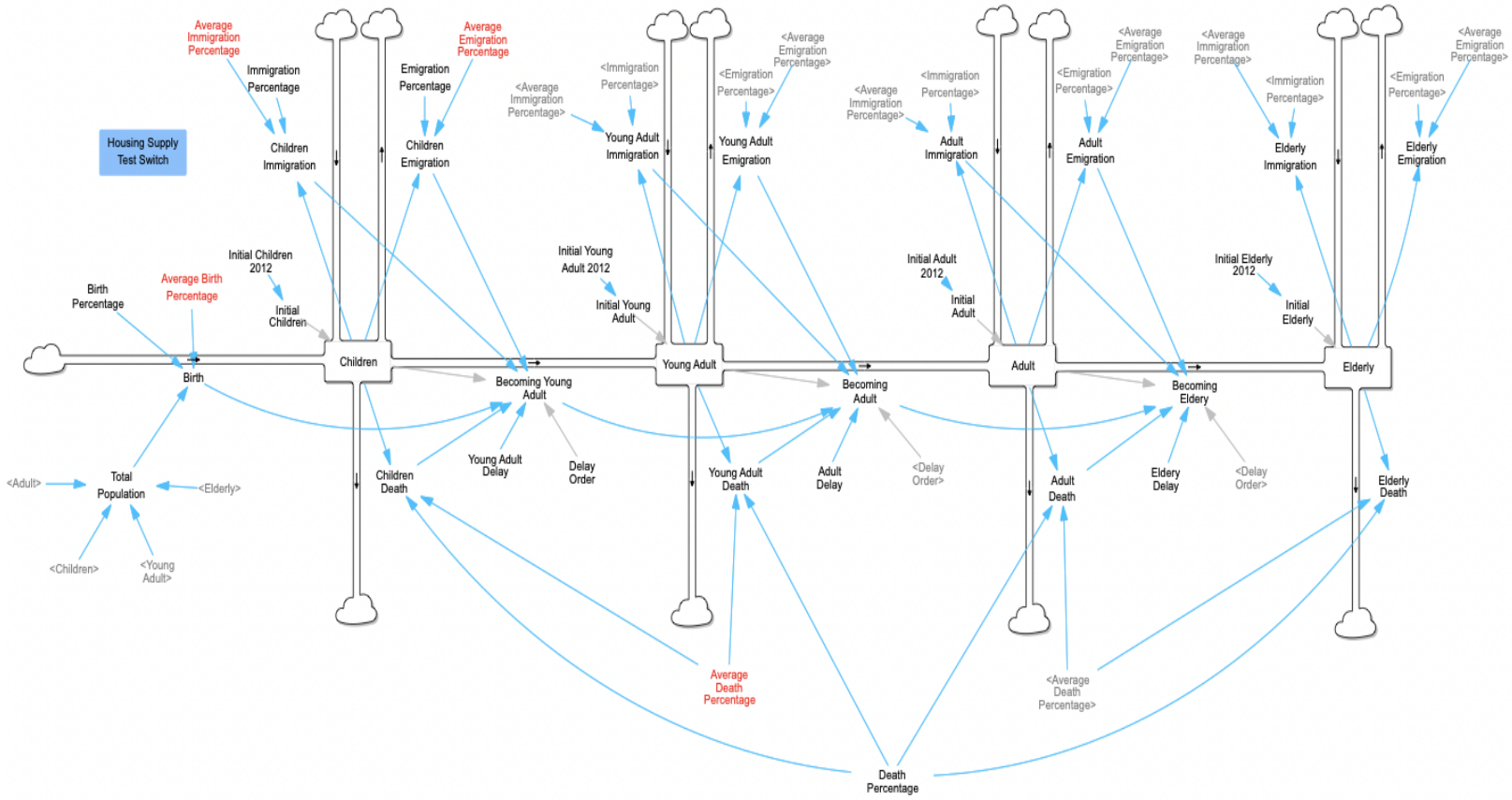

Figure A.1: Overview of the population component of the population sub-model.

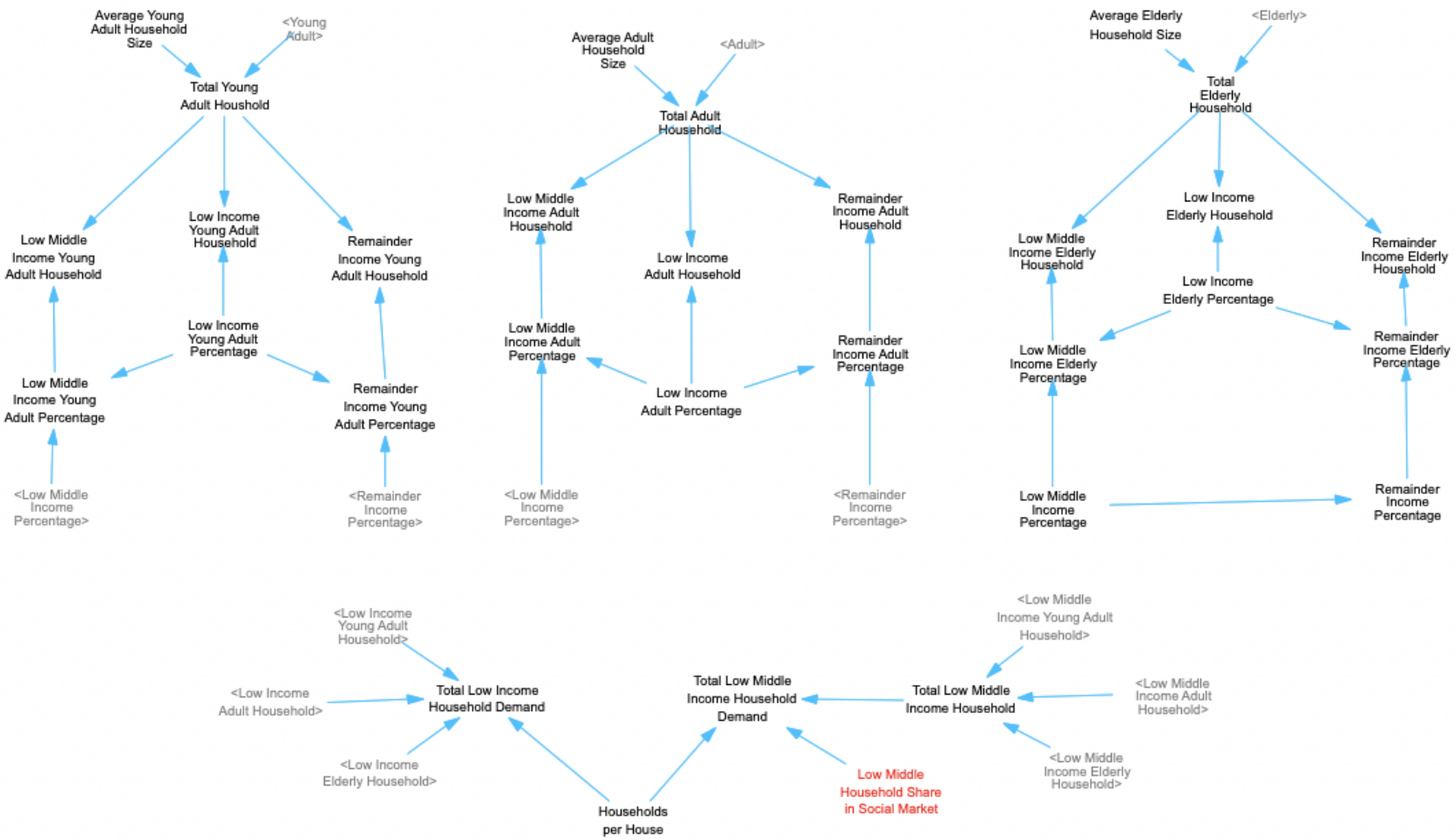

Figure A.2: Overview of the household component of the population sub-model.

A.1.2 Housing Market Sub-model

In this section, the model components of the housing market sub-model are presented. In particular, this sub-model is divided into the planning capacity component (see Figure A.3) and the housing supply component (see Figure A.4). The planning capacity components was used in this model to calculate the amount of planning capacity that social housing organisations have available to construct new social housing. The housing supply component tsubsequently depicts the development of the social housing associations' housing supply. This model component, in particular, represents the entire process of these homes, from the planning stage all the way to and including their demolition.

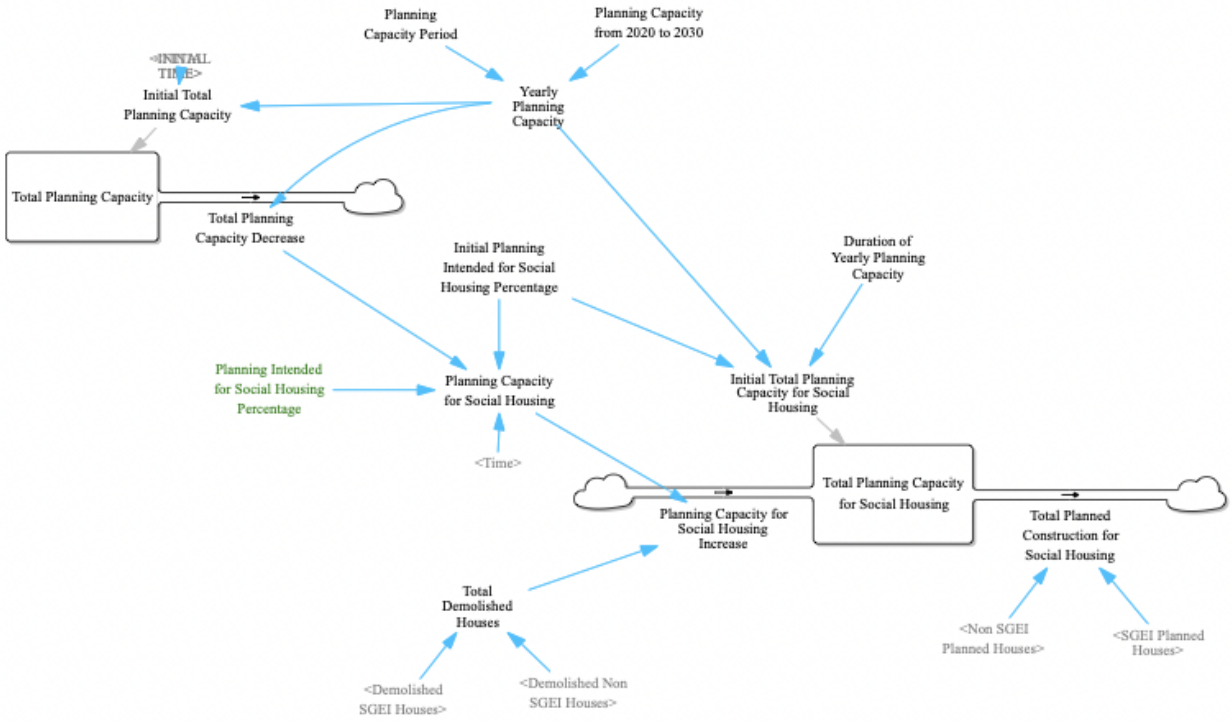

Figure A.3: Overview of the planning capacity component of the housing market sub-model.

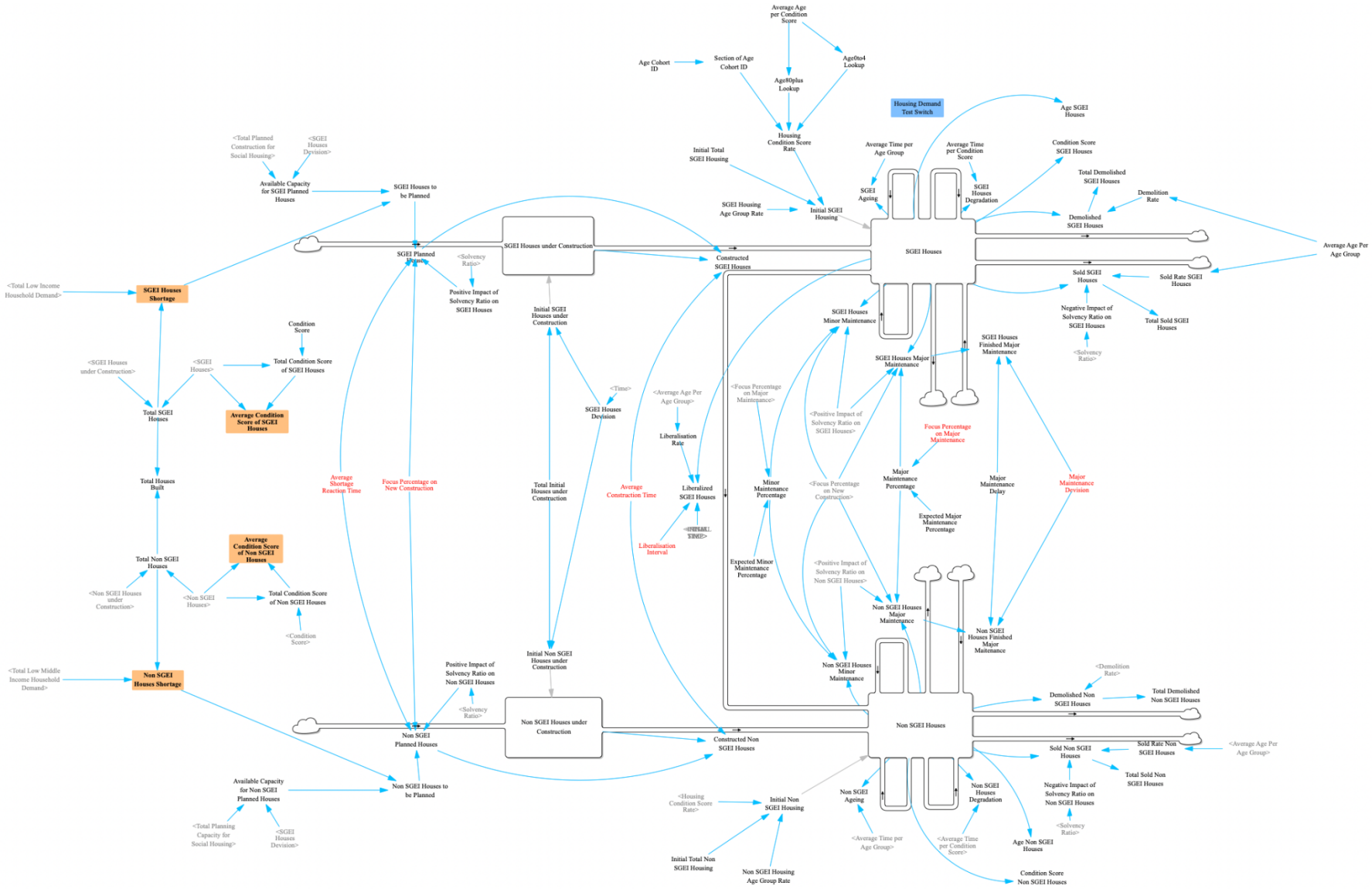

Figure A.4: Overview of the housing supply component of the housing market sub-model.

A.1.3 Financial Sub-model

In this section, the model components of the financial sub-model are presented. In particular, this sub-model is divided into the solvency component (see Figure A.5) and the cash flow component (see Figure A.6). The solvency ratio of the social housing associations in the region in question was calculated using the sub-model's solvency component, which provided insight into their financial standing. Moreover, the cash flow component offers more accurate insights into the income (see Figure A.7) and expenses (see Figure A.8) incurred by the social housing association throughout the creation and administration of their social housing.

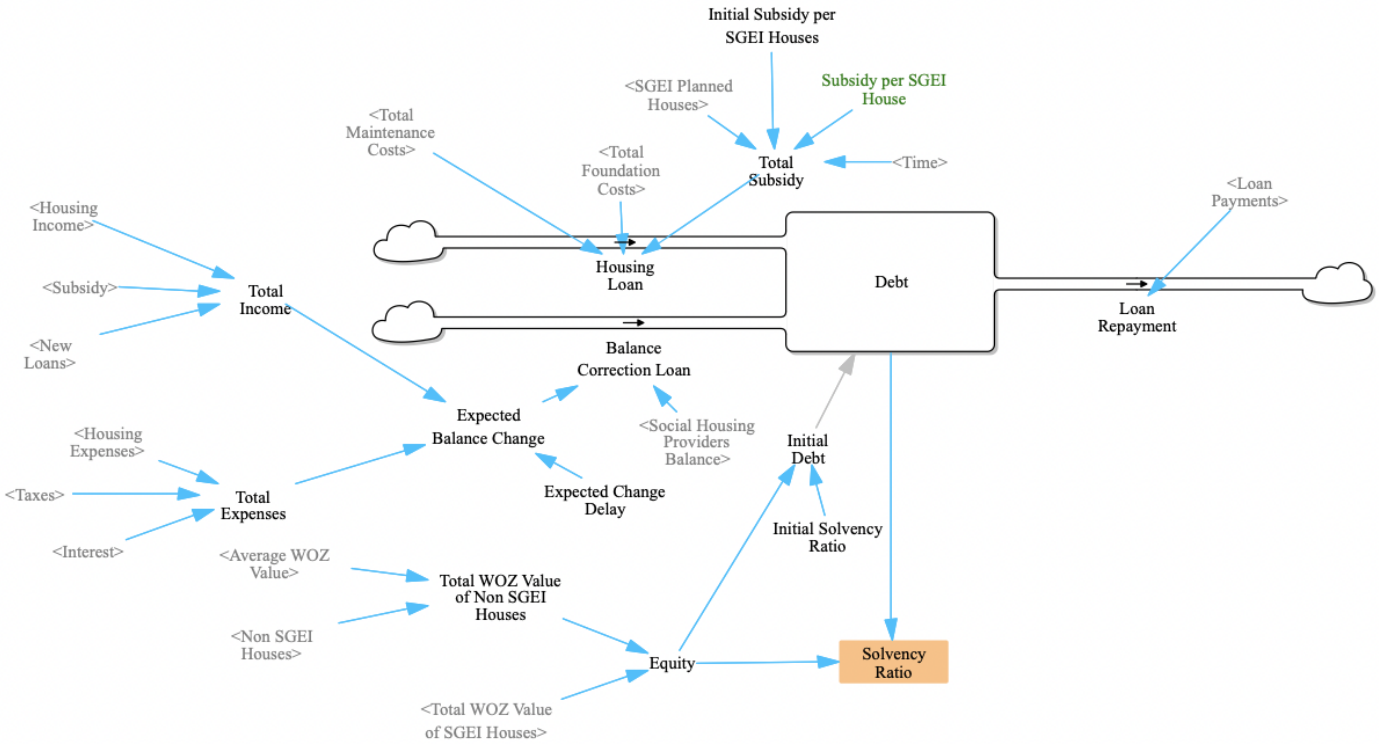

Figure A.5: Overview of the solvency component of the financial sub-model.

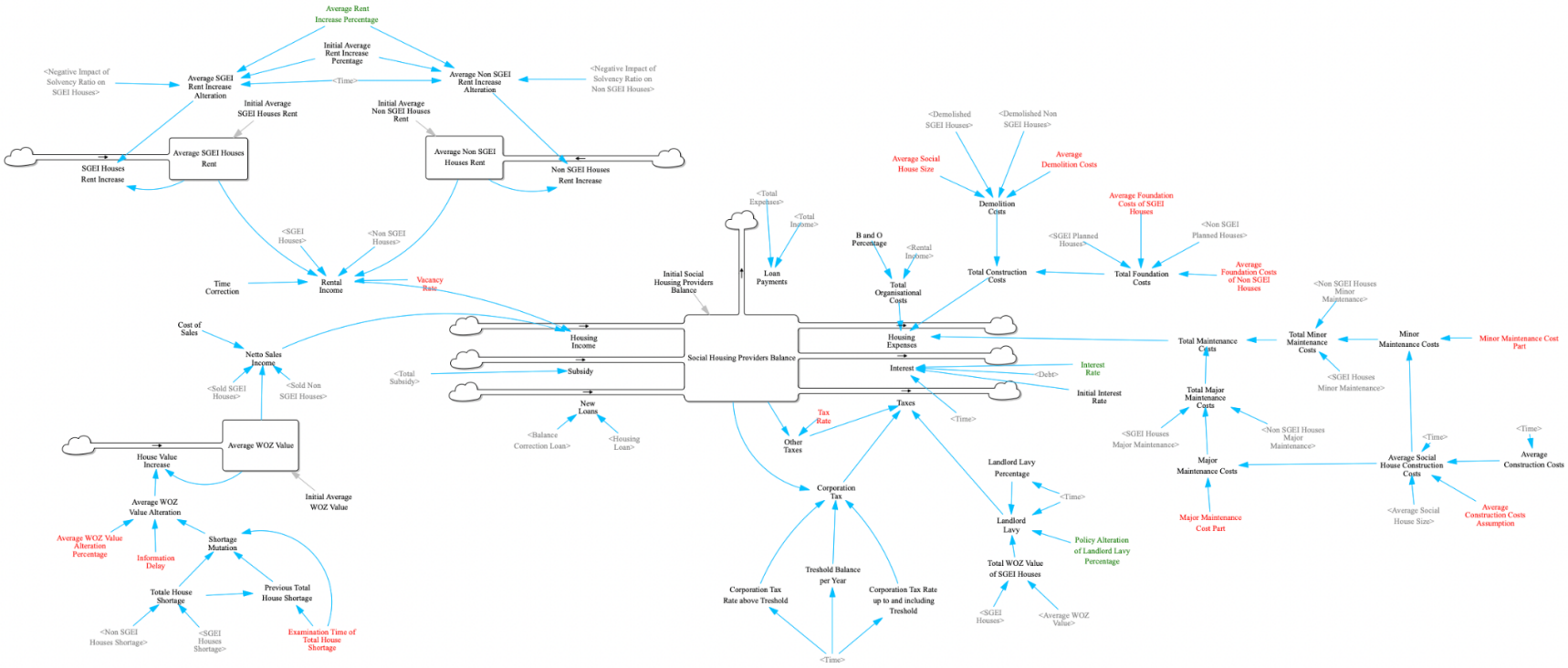

Figure A.6: Overview of the cash flow component of the financial sub-model.

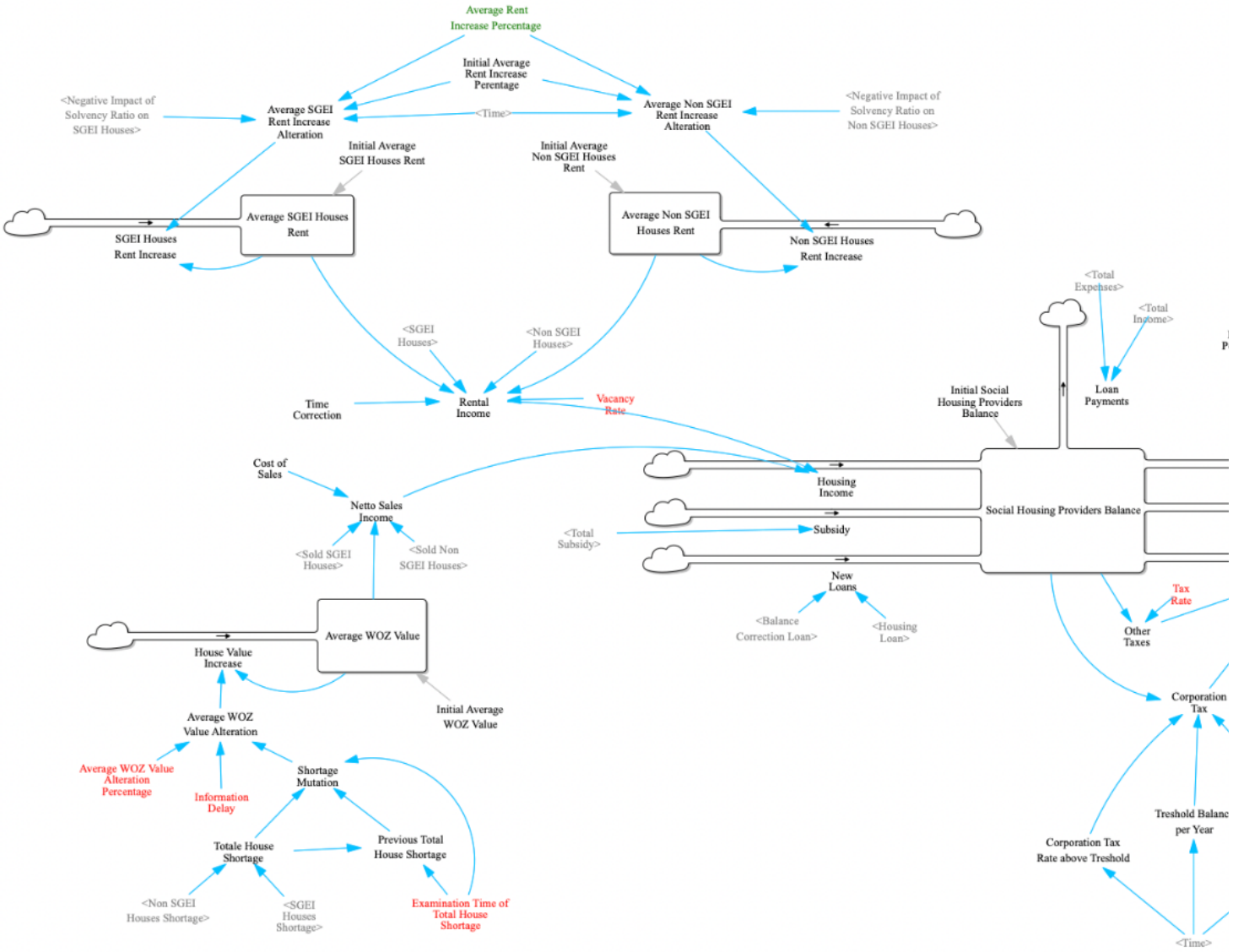

Figure A.7: Overview of the cash flow component of the financial sub-model (focused on the social housing associations' incomes).

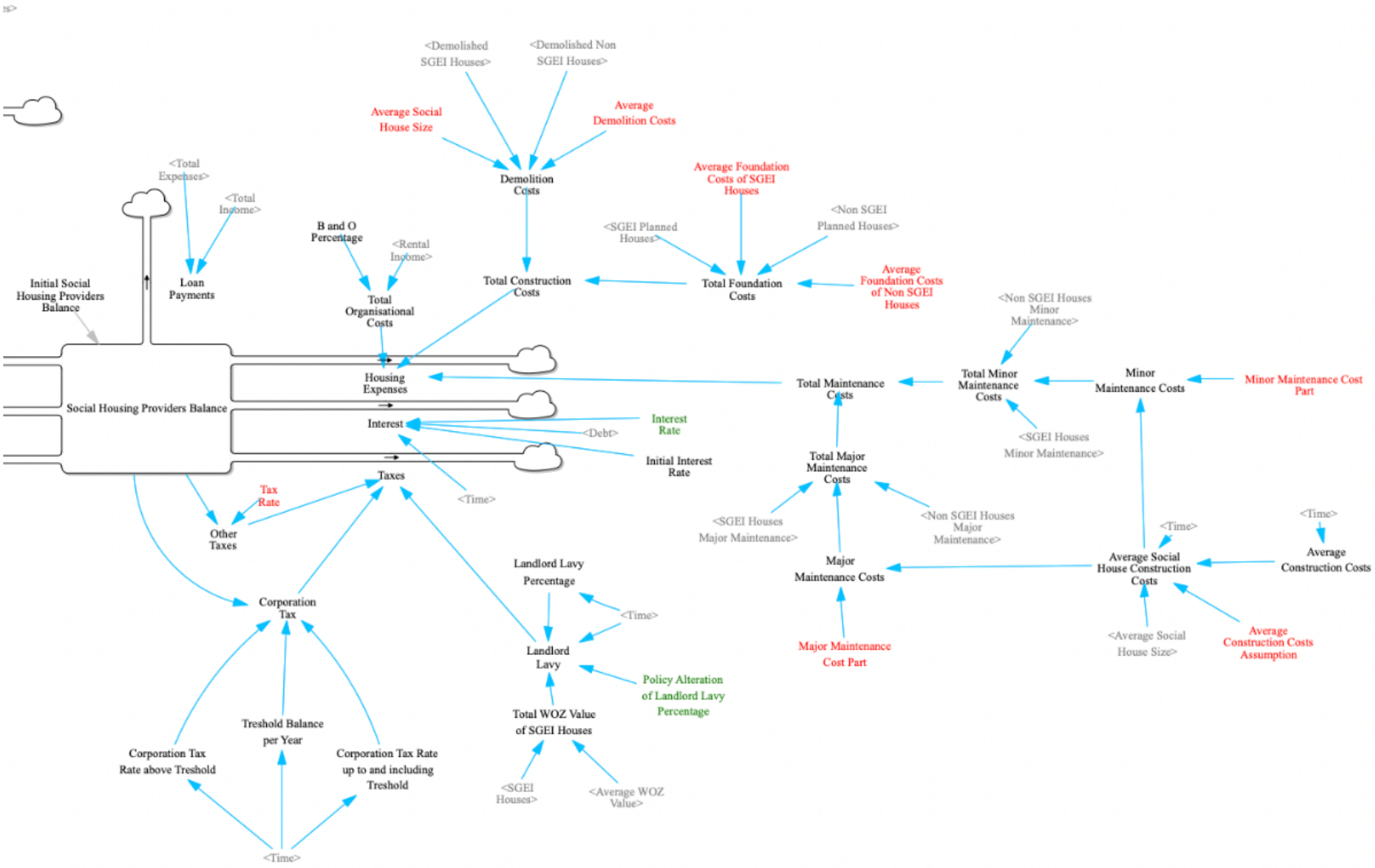

Figure A.6: Overview of the cash flow component of the financial sub-model (focused on the social housing associations' expenses).

A.2 Model Structure Specification

The implementation of the numerous variables that make up the sub-models in Vensim is covered in more detail in this section of the appendix. In this study, this is done by using two tables, namely Table A.1 and A.2. The full list of input parameters and their corresponding initial values for the base case are displayed in Table A.1. Subsequently, all model equations implemented in the sub-models are shown in Table A.2.

Table A.1: Overview of all parameters used in the Dutch Social Housing Model.

Sub-model	Parameter	Unit	Value	Explenation
Population	Average Birth Percentage	$\frac{Dmnl}{Year}$	0.0101	The average frequency of childbirth in the region in question.
	Initial Children 2012	$Person$	212725	The amount of children (person between 0 and 17 years) living in the region in question in the year 2012 (CBS, 2022[b]).
	Average Immigration Percentage	$\frac{Dmnl}{Year}$	0.0126	The average frequency thet people move to the region in question.
	Average Emigration Percentage	$\frac{Dmnl}{Year}$	0.0088	The average frequency that people move from the region in question.
	Average Death Percentage	$\frac{Dmnl}{Year}$	0.0089	The average frequency that people pas away in the region in question.
	Young Adult Delay	$Year$	17	In this model, it takes 17 years for a child to become an young adult.
	Delay Order	$Dmnl$	10	A high order delay of 10 was selected to make sure that the persons in this model transition from one group to another exactly after the predetermined time.
	Initial Young Adult 2012	$Person$	244112	The amount of young adults (person between 18 and 34 years) living in the region in question in the year 2012 (CBS, 2022[b])
	Adult Delay	$Year$	16	In this model, it takes 16 years for a young adult (person between 18 and 34 years) to become an adult.
	Initial Adult 2012	$Person$	302238	The amount of adults (person between 35 and 54 years) living in the region in question in the year 2012 (CBS, 2022[b])
	Elderly Delay	$Year$	19	In this model, it takes 19 years for a adult (person between 35 and 54 years) to become an elderly.
	Initial Elderly 2012	$Person$	279451	The amount of elderly people (person 55+ years) living in the region in question in the year 2012 (CBS, 2022[b])

	Housing Demand Test Switch	*Dmnl*	0	Switch for the execution of the extreme condition test regarding the housing demand, and it is inactive if it has a value of 0. An extremely low housing demand will be ensured by this switch if its value is 1, and an extremely high housing demand will be ensured by it if its value is 2.
	Extremely Low Population Factor	*Dmnl*	0	The initial value of the population will be multiplied by this value to ensure an extremely low housing demand for the execution of the extreme condition test.
	Extremely High Population Factor	*Dmnl*	10000	The initial value of the population will be multiplied by this value to ensure an extremely high housing demand for the execution of the extreme condition test.
	Average Young Adult Household Size	$\frac{Person}{Household}$	1.842	Average number of people living in one of households made up of young adults (BZK, 2021)
	Low Income Young Adult Percentage	*Dmnl*	0.55	Proportion of the households made up of young adults that have a low income (BZK, 2021)
	Low Middle Income Percentage	*Dmnl*	0.391	Percentage of households with a middle-low income.
	Average Adult Household Size	$\frac{Person}{Household}$	2.683	Average number of people living in one of households made up of adults (BZK, 2021)
	Low Income Adult Percentage	*Dmnl*	0.361	Proportion of the households made up of adults that have a low income (BZK, 2021)
	Average Elderly Household Size	$\frac{Person}{Household}$	1.674	Average number of people living in one of households made up of elderly peoples (BZK, 2021)
	Low Income Elderly Percentage	*Dmnl*	0.508	Proportion of the households made up of elderly people that have a low income (BZK, 2021)
	Households per House	$\frac{Household}{House}$	1	Each household will rent a single social house in this model.
	Low Middle Household Share in Social Market	*Dmnl*	0.4	Portion of households with low-middle income who want to rent a home from social housing corporations.
Social Housing	Total Initial Houses under Construction	*House*	3015	The total amount of homes that the social housing associations were building at the start of the model (CBS, 2022[c]).
	Average Shortage Reaction Time	*Year*	0.75	Amount of time it takes before new houses can be scheduled to be build when there is a shortage of houses in the model.

	Planning Intended for Social Housing Percentage	*Dmnl*	0.3	Proportion of the overall annual planning capacity designated for the development of social housing (Raad van State, 2012). The value of this parameter will be adjusted during the policy analysis to gain insights in the associated policy.
	Initial Planning Intended for Social Housing Percentage	*Dmnl*	0.3	Proportion of the overall annual planning capacity designated for the development of social housing at the start of the model (Raad van State, 2012).
	Duration of Yearly Planning Capacity	*Year*	1	A Yearly Planning Capacity will be valid for 1 year in this model.
	Planning Capacity Period	*Year*	10	The period of time (from 2020 to 2030) during which the planning capacity is valid (Groenemeijer & Van der Lelij, 2020).
	Planning Capacity from 2020 to 2030	*House*	137500	The number of houses that is expected to be constructed between 2020 and 2030 in the region in question (Groenemeijer & Van der Lelij, 2020).
	Average Construction Time	*Year*	3	Amount of time it takes to built new houses in this model.
	SGEI Housing Age Group Rate [AgeGroups]	*Dmnl*	0.023, 0.023, 0.036, 0.036, 0.054, 0.054, 0.108, 0.108, 0.066, 0.066, 0.075, 0.075, 0.089, 0.089, 0.034, 0.032, 0.032	Proportion of the total number of SGEI houses in a specific age group (BZK, 2021).
	Initial Total SGEI Housing	*House*	170739	The total amount of SGEI homes that the social housing associations possess at the start of the model (CBS, 2022[c]).
	Age Cohort ID [AgeGroups]	*Dmnl*	0,1,2,3,4,5,6,7, 8,9,10,11,12,13 ,14,15,16	Specific number by which a certain age group can be identified in the model.
	Average Age per Condition Score [ConditionScore]	*Year*	4.5, 14.5, 24.5, 34.5, 44.5, 54.5	Average age of the houses in a specific condition score.
	Average Time per Age Group	*Year*	5	Each house will remain in each age group for approximately 5 years, as these ages are categorized in increments of 5.
	Average Time per Condition Score	*Year*	10	Each house lasts about 10 years in any condition score.

	Average Age Per Age Group [AgeGroups]	*Year*	2.5, 7.5, 12.5, 17.5, 22.5, 27.5, 32.5, 37.5, 42.5, 47.5, 52.5, 57.5, 62.5, 67.5, 72.5, 77.5, 82.5	Average age of the houses in a specific age group.
	Minor Maintenance Percentage [MaintenanceRange]	$\frac{Dmnl}{Year}$	0, 0.05, 0.075, 0.1, 0.2	Proportion of the total homes in the subscript "MaintenanceRange" that undergo minor maintenance.
	Major Maintenance Percentage [MaintenanceRange]	$\frac{Dmnl}{Year}$	0, 0, 0.05, 0.15, 0.3	Proportion of the total homes in the subscript "MaintenanceRange" that undergo major maintenance.
	Major Maintenance Delay	*Year*	1.5	Amount of time it takes for a home to undergo major maintenance.
	Major Maintenance Devision [MaintenanceRange]	*Dmnl*	0.65, 0.3, 0.05, 0, 0	The manner in which the houses that have undergone major maintenance are divided into the subscript "MaintenanceRange".
	Non SGEI Housing Age Group Rate [AgeGroups]	*Dmnl*	0.107, 0.107, 0.143, 0.143, 0.041, 0.041, 0.072, 0.072, 0.085, 0.085, 0.015, 0.015, 0.01, 0.01, 0.027, 0.0135, 0.0135	Proportion of the total number of Non SGEI houses in a specific age group (BZK, 2021).
	Initial Total Non SGEI Housing	*House*	73174	The total amount of Non SGEI homes that the social housing associations possess at the start of the model (CBS, 2022[b]).
	Condition Score [ConditionScore]	$\frac{Dmnl}{House}$	1, 2, 3, 4, 5, 6	This parameter is used to represent a house's condition score in this model (Dankert, n.d.)
	Focus Percentage on New Construction	*Dmnl*	0.7	Proportion of the funds that social housing associations invest in the construction of new houses as opposed to the maintenance of existing houses.
	Focus Percentage on Major Maintenance	*Dmnl*	0.3	Proportion of the funds that social housing associations invest in major maintenance as opposed to minor maintenance.
Economic	Initial Social Housing Providers Balance	*Euro*	2000000	The cash flow balance of the social housing associations in the region in question at the start of the model.
	Cost of Sales	*Dmnl*	0.1	The portion of the home's sales price that goes toward social housing associations' costs (Eskinasi, 2022).

	Initial Average WOZ Value	$\frac{Euro}{House}$	230000	The average WOZ value per house that the social housing associations owens at the start of the model (CBS (2020[d])
	Average WOZ Value Increase Percentage	$\frac{Dmnl}{Year}$	0.08085	The percentage that the average WOZ value per house increases based on the housing shortage mutation.
	Information Delay	$Year$	0.85	The amount of time it takes before the Average WOZ value responds to the housing shortage mutation.
	Examination Time of Total House Shortage	$Year$	0.0808	The time interval at which the housing shortage mutation is calculated in this model.
	Time Correction	$\frac{Month}{Year}$	12	Each year is divided into 12 months.
	Vacancy Rate	$Dmnl$	0.04	The percentage of all residences owned by housing associations for which no rent has been paid.
	Initial Average SGEI Houses Rent	$\frac{Euro}{House * Month}$	457	Average rental price per SGEI houses that are owned by the social housing associations in the region in question at the start of the model (Woonbond, 2017).
	Average Rent Increase Percentage	$\frac{Dmnl}{Year}$	0.009	The percentage at which the average rental price increases after 2022. The value of this parameter will be adjusted during the policy analysis to gain insights in the associated policy
	Initial Average Rent Increase Perentage	$\frac{Dmnl}{Year}$	0.009	The percentage at which the average rental price increases before 2022.
	Initial Average Non SGEI Houses Rent	$\frac{Euro}{House * Month}$	968	Average rental price per Non SGEI houses that are owned by the social housing associations in the region in question at the start of the model (Spiering, 2013).
	Initial Solvency Ratio	$Dmnl$	0.277	The solvency ratio of the social housing associations in the region in question at the start of the model (CFV, 2012).
	Subsidy per SGEI House	$\frac{Euro}{House}$	0	Amount of the subsidy that social housing organizations receive for each SGEI home built after the yer 2022. The value of this parameter will be adjusted during the policy analysis to gain insights in the associated policy.
	Initial Subsidy per SGEI House	$\frac{Euro}{House}$	0	Amount of the subsidy that social housing organizations receive for each SGEI home built before 2022.
	Expected Change Delay	$Year$	1	The time interval at which the change in cash flow balance is calculated in this model.

	B and O Percentage	$Dmnl$	0.11	The portion of the rental income that goes toward social housing associations' management costs (Eskinasi, 2022).
	Average Social House Size	$\frac{m^2}{House}$	84	Average size of social housing owned by the social housing associations in this model (Tweede Kamer der Staten-Generaal, 2018).
	Average Demolition Costs	$\frac{Euro}{m^2}$	50	Average costs involved with demolishing a house in this model (Viveen, 2022).
	Average Foundation Costs of SGEI Houses	$\frac{Euro}{House}$	200300	Average foundation costs (sum of construction costs and land costs) in order to buil a SGEI house in this model (Pikoleit, et al, 2020).
	Average Foundation Costs of Non SGEI Houses	$\frac{Euro}{House}$	215600	Average foundation costs (sum of construction costs and land costs) in order to buil a Non SGEI house in this model (Pikoleit, et al, 2020).
	Major Maintenance Cost Part	$Dmnl$	0.8	A portion of the construction expenditures that go toward carrying out major maintenance.
	Average Construction Costs Assumption	$\frac{Euro}{m^2}$	300	Average costs to built a new house after 2022 in this model.
	Minor Maintenance Cost Part	$Dmnl$	0.4	A portion of the construction expenditures that go toward carrying out minor maintenance.
	Tax Rate	$\frac{Dmnl}{Year}$	0.05	Percentage of the social housing associations' cash flow balance that must be used to pay the “other taxes” (Aedes, 2021).
	Policy Alteration of Landlord Lavy Percentage	$Dmnl$	1	This parameter is used in this model to regulate the lendlord levy's rise or decrease. The value of this parameter will be adjusted during the policy analysis to gain insights in the associated policy.
	Interest Rate	$\frac{Dmnl}{Year}$	0.016	Percentage of the loans made by the social housing associations for which interest has to be paid after 2022 (Dungelmann & Majoor, 2021). The value of this parameter will be adjusted during the policy analysis to gain insights in the associated policy.
	Initial Interest Rate	$\frac{Dmnl}{Year}$	0.016	Percentage of the loans made by the social housing associations for which interest has to be paid before 2022 (Dungelmann & Majoor, 2021).

Table A.2: Overview of all equations used in the Dutch Social Housing Model.

Sub-model	Variable	Unit	Equation	Explenation
Population	Birth	$\frac{Person}{Year}$	Total Population * IF THEN ELSE (Time < 2022, Birth Percentage, Average Birth Percentage)	This variable represents the proportion of the population that is born as children each time step. This proportion is represented by Birth Percentage before 2022, and Average Birth Percentage thereafter.
	Birth Percentage	$\frac{Dmnl}{Year}$	WITH LOOKUP (Time, ([(2012,0)-(2050,0.015)],(2012,0.0105),(2013,0.0102),(2014,0.0104),(2015,0.0101),(2016,0.0102),(2017,0.0099),(2018,0.0098),(2019,0.0098),(2020,0.0097),(2021,0.0102),(2022,0.0101),(2050,0.0101)))	This variable represents the frequency of childbirth in the region in question (CBS, 2022[a]).
	Total Population	$Person$	Children + Young Adult + Adult + Elderly	This variable represents the overall population of the region in question, by taking adding Children, Young Adult, Adult and Elderly together.
	Initial Children	$Person$	Initial Children 2012 * IF THEN ELSE(Housing Demand Test Switch = 0 , 1 , IF THEN ELSE(Housing Demand Test Switch = 1 , Extremely Low Population Factor , Extremely High Population Factor))	This variable represents the amount of children at the start of the model run. This variable usually equals Initial Children 2012, but in the execution of the extreme condition test, Initial Children 2012 will be multiplied by either Extremely Low Population Factor or Extremely High Population Factor.
	Children	$Person$	INTEG (Birth+Children Immigration-Becoming Young Adult-Children Death-Children Emigration, Initial Children)	This variable represents the number of children (person between 0 and 17 years) in the population of the region in question.
	Children Immigration	$\frac{Person}{Year}$	Children * IF THEN ELSE (Time < 2022, Immigration Percentage , Average Immigration Percentage)	This variable represents the proportion of the children who move to the region in question. This proportion is represented by Immigration Percentage before 2022, and Average Immigration Percentage thereafter.
	Immigration Percentage	$\frac{Dmnl}{Year}$	WITH LOOKUP (Time, ([(2012,0.009)-(2050,0.02)],(2012,0.0095),(2013,0.0098),(2014,0.0109),(2015,0.0121),(2016,0.0136),(2017,0.0138),(2018,0.0142),(2019,0.0156),(2020,0.0127),(2021,0.0144),(2022,0.0126),(2050,0.0126)))	This variable represents the rate of immigration in the region in question (CBS, 2022[a]).

	Children Emigration	$\frac{Person}{Year}$	Children * IF THEN ELSE (Time < 2022, Emigration Percentage , Average Emigration Percentage)	This variable represents the proportion of the children who move from the region in question. This proportion is represented by Emigration Percentage before 2022, and Average Emigration Percentage thereafter.
	Emigration Percentage	$\frac{Dmnl}{Year}$	WITH LOOKUP (Time, ([(2012,0.008)-(2050,0.01)],(2012,0.0086),(2013,0.0087),(2014,0.0088),(2015,0.0088),(2016,0.0089),(2017,0.009),(2018,0.0092),(2019,0.0093),(2020,0.0088),(2021,0.0082),(2022,0.0088),(2050,0.0088))	This variable represents the rate of emigration in the region in question (CBS, 2022[a]).
	Children Death	$\frac{Person}{Year}$	Children * IF THEN ELSE (Time < 2022 , Death Percentage , Average Death Percentage)	This variable represents the proportion of the children who pass away in the region in question. This proportion is represented by Death Percentage before 2022, and Average Death Percentage thereafter.
	Death Percentage	$\frac{Dmnl}{Year}$	WITH LOOKUP (Time, ([(2012,0)-(2050,0.01)],(2012,0.0084),(2013,0.0084),(2014,0.0083),(2015,0.0087),(2016,0.0088),(2017,0.0088),(2018,0.0089),(2019,0.0088),(2020,0.0097),(2021,0.0098),(2022,0.0089),(2050,0.0089)))	This variable represents the mortality rate of the region in question (CBS, 2022[a]).
	Becoming Young Adult	$\frac{Person}{Year}$	DELAY N((Birth + Children Immigration - Children Death - Children Emigration), Young Adult Delay, (Children/Young Adult Delay), Delay Order)	This variable represents the proportion of children who are growing up and becoming young adults.
	Initial Young Adult	$Person$	Initial Young Adult 2012 * IF THEN ELSE(Housing Demand Test Switch = 0 , 1 , IF THEN ELSE(Housing Demand Test Switch = 1 , Extremely Low Population Factor , Extremely High Population Factor))	This variable represents the amount of young adults at the start of the model run. This variable usually equals Initial Young Adult 2012, but in the execution of the extreme condition test, Initial Young Adult 2012 will be multiplied by either Extremely Low Population Factor or Extremely High Population Factor.
	Young Adult	$Person$	INTEG (Becoming Young Adult+Young Adult Immigration-Becoming Adult-Young Adult Death-Young Adult Emigration, Initial Young Adult)	This variable represents the number of young adults (person between 18 and 34 years) in the population of the region in question.
	Young Adult Immigration	$\frac{Person}{Year}$	Young Adult * (IF THEN ELSE (Time < 2022 , Immigration Percentage , Average Immigration Percentage)	This variable represents the proportion of the young adults who move to the region in question. This proportion is represented by Immigration Percentage before 2022, and Average Immigration Percentage thereafter.

	Young Adult Emigration	$\frac{Person}{Year}$	Young Adult * IF THEN ELSE (Time < 2022 , Emigration Percentage, Average Emigration Percentage)	This variable represents the proportion of the young adults who move from the region in question. This proportion is represented by Immigration Percentage before 2022, and Average Immigration Percentage thereafter.
	Young Adult Death	$\frac{Person}{Year}$	Young Adult * IF THEN ELSE (Time < 2022 , Death Percentage, Average Death Percentage)	This variable represents the proportion of the young adults who pass away in the region in question. This proportion is represented by Death Percentage before 2022, and Average Death Percentage thereafter.
	Becoming Adult	$\frac{Person}{Year}$	DELAY N((Becoming Young Adult + Young Adult Immigration - Young Adult Death - Young Adult Emigration), Adult Delay, (Young Adult/Adult Delay), Delay Order)	This variable represents the number of young adults turing into adults.
	Initial Adult	$Person$	Initial Adult 2012 * IF THEN ELSE(Housing Demand Test Switch = 0 , 1 , IF THEN ELSE(Housing Demand Test Switch = 1 , Extremely Low Population Factor , Extremely High Population Factor))	This variable represents the amount of adults at the start of the model run. This variable usually equals Initial Adult 2012, but in the execution of the extreme condition test, Initial Adult 2012 will be multiplied by either Extremely Low Population Factor or Extremely High Population Factor.
	Adult	$Person$	INTEG (Adult Immigration+Becoming Adult-Adult Death-Adult Emigration -Becoming Elderly, Initial Adult)	This variable represents the number of adults (person between 35 and 54 years) in the population of the region in question.
	Adult Immigration	$\frac{Person}{Year}$	Adult * IF THEN ELSE (Time < 2022 , Immigration Percentage, Average Immigration Percentage)	This variable represents the proportion of the adults who move to the region in question. This proportion is represented by Immigration Percentage before 2022, and Average Immigration Percentage thereafter.
	Adult Emigration	$\frac{Person}{Year}$	Adult * IF THEN ELSE (Time < 2022 , Emigration Percentage, Average Emigration Percentage)	This variable represents the proportion of the adults who move from the region in question. This proportion is represented by Immigration Percentage before 2022, and Average Immigration Percentage thereafter.
	Adult Death	$\frac{Person}{Year}$	Adult * IF THEN ELSE (Time < 2022 , Death Percentage, Average Death Percentage)	This variable represents the proportion of the adults who pass away in the region in question. This proportion is represented by Death Percentage before 2022, and Average Death Percentage thereafter.

	Becoming Elderly	$\frac{Person}{Year}$	DELAY N((Becoming Adult + Adult Immigration - Adult Death - Adult Emigration) , Elderly Delay , (Adult/Elderly Delay), Delay Order)	This variable represents the number of adults turing into elderly people.
	Initial Elderly	$Person$	Initial Elderly 2012 * IF THEN ELSE(Housing Demand Test Switch = 0 , 1 , IF THEN ELSE(Housing Demand Test Switch = 1 , Extremely Low Population Factor , Extremely High Population Factor))	This variable represents the amount of elderly persons at the start of the model run. This variable usually equals Initial Elderly 2012, but in the execution of the extreme condition test, Initial Elderly 2012 will be multiplied by either Extremely Low Population Factor or Extremely High Population Factor.
	Elderly	$Person$	INTEG (Becoming Elderly+Elderly Immigration-Elderly Death-Elderly Emigration, Initial Elderly)	This variable represents the number of elderly persons (person with 55+ years) in the population of the region in question.
	Elderly Immigration	$\frac{Person}{Year}$	Elderly * IF THEN ELSE (Time < 2022 , Immigration Percentage , Average Immigration Percentage)	This variable represents the proportion of the elderly persons who move to the region in question. This proportion is represented by Immigration Percentage before 2022, and Average Immigration Percentage thereafter.
	Elderly Emigration	$\frac{Person}{Year}$	Elderly * IF THEN ELSE (Time < 2022 , Emigration Percentage , Average Emigration Percentage)	This variable represents the proportion of the elderly persons who move from the region in question. This proportion is represented by Immigration Percentage before 2022, and Average Immigration Percentage thereafter.
	Elderly Death	$\frac{Person}{Year}$	Elderly * IF THEN ELSE (Time < 2022 , Death Percentage , Average Death Percentage)	This variable represents the proportion of the elderly persons who pass away in the region in question. This proportion is represented by Death Percentage before 2022, and Average Death Percentage thereafter.
	Total Young Adult Houshold	$Household$	Young Adult/Average Young Adult Household Size	This variable represents the total amount of households in the region in question that consist of young adults, which is computed by dividing the variable Young Adult by Average Young Adult Household Size.
	Low Income Young Adult Household	$Household$	Low Income Young Adult Percentage * Total Young Adult Houshold	This variable represents the proportion of the total amount of households in the region in question that consist of young adults who have low incomes. This proportion is represented by Low Income Young Adult Percentage in this model.

	Low Middle Income Young Adult Percentage	*Dmnl*	(1-Low Income Young Adult Percentage) * Low Middle Income Percentage	This variable represents the percentage of households that consist of young adults who have middle-low incomes.
	Low Middle Income Young Adult Household	*Household*	Low Middle Income Young Adult Percentage * Total Young Adult Houshold	This variable represents the proportion of the total amount of households in the region in question that consist of young adults who have middle-low incomes. This proportion is represented by Low Middle Income Young Adult Percentage in this model.
	Remainder Income Young Adult Percentage	*Dmnl*	(1-Low Income Young Adult Percentage) *Remainder Income Percentage	This variable represents the percentage of households that consist of young adults who have incomes that belong in neither low nor middle-low class.
	Remainder Income Percentage	*Dmnl*	1 - Low Middle Income Percentage	This variable represents the percentage of households who have an income that belong in neither low nor middle-low class in this model.
	Remainder Income Young Adult Household	*Household*	Remainder Income Young Adult Percentage * Total Young Adult Houshold	This variable represents the proportion of the total amount of households in the region in question that consist of young adults who have incomes that belong in neither low nor middle-low class. This proportion is represented by Remainder Income Young Adult Percentage in this model.
	Total Adult Household	*Household*	Adult/Average Adult Household Size	This variable represents the total amount of households in the region in question that consist of adults, which is computed by dividing the variable Adult by Average Adult Household Size.
	Low Income Adult Household	*Household*	Low Income Adult Percentage * Total Adult Household	This variable represents the proportion of the total amount of households in the region in question that consist of adults who have low incomes. This proportion is represented by Low Income Adult Percentage in this model.
	Low Middle Income Adult Percentage	*Dmnl*	(1-Low Income Adult Percentage) * Low Middle Income Percentage	This variable represents the percentage of households that consist of adults who have middle-low incomes.

	Low Middle Income Adult Household	*Household*	Low Middle Income Adult Percentage * Total Adult Household	This variable represents the proportion of the total amount of households in the region in question that consist of adults who have middle-low incomes. This proportion is represented by Low Middle Income Adult Percentage in this model.
	Remainder Income Adult Percentage	*Dmnl*	(1-Low Income Adult Percentage) * Remainder Income Percentage	This variable represents the percentage of households that consist of adults with incomes that belong in neither low nor middle-low class.
	Remainder Income Adult Household	*Household*	Remainder Income Adult Percentage * Total Adult Household	This variable represents the proportion of the total amount of households in the region in question that consist of adults who have incomes that belong in neither low nor middle-low class. This proportion is represented by Remainder Income Adult Percentage in this model.
	Total Elderly Household	*Household*	Elderly/Average Elderly Household Size	This variable represents the total amount of households in the region in question that consist of elderly peoples, which is computed by dividing the variable Elderly by Average Elderly Household Size.
	Low Income Elderly Household	*Household*	Low Income Elderly Percentage * Total Eldrly Household	This variable represents the proportion of the total amount of households in the region in question that consist of elderly peoples who have low incomes. This proportion is represented by Low Income Elderly Percentage in this model.
	Low Middle Income Elderly Percentage	*Dmnl*	(1-Low Income Elderly Percentage) * Low Middle Income Percentage	This variable represents the percentage of households that consist of elderly peoples who have middle-low incomes.
	Low Middle Income Elderly Household	*Household*	Low Middle Income Elderly Percentage * Total Elderly Household	This variable represents the proportion of the total amount of households in the region in question that consist of elderly peoples who have middle-low incomes. This proportion is represented by Low Middle Income Elderly Percentage in this model.
	Remainder Income Elderly Percentage	*Dmnl*	(1-Low Income Elderly Percentage) * Remainder Income Percentage	This variable represents the percentage of households that consist of elderly peoples who have incomes that belong in neither low nor middle-low class

	Remainder Income Elderly Household	*Household*	Remainder Income Elderly Percentage * Total Elderly Household	This variable represents the proportion of the total amount of households in the region in question that consist of elderly peoples who have incomes that belong in neither low nor middle-low class. This proportion is represented by Remainder Income Elderly Percentage in this model.
	Total Low Income Household Demand	*House*	(Low Income Young Adult Household + Low Income Adult Household + Low Income Elderly Household) / Households per House	This variable represents the overall housing demand of households with low income in the region in question.
	Total Low Middle Income Household Demand	*House*	(Total Low Middle Income Household/ Households per House) * Low Middle Household Share in Social Market	This variable represents the overall housing demand of households with middle-low income in the region in question.
	Total Low Middle Income Household	*House*	Low Middle Income Young Adult Household + Low Middle Income Adult Household + Low Middle Income Elderly Household	This variable represents all households with middle-low income in the region in question.
Social Housing	Total Houses Built	*House*	Total Non SGEI Houses + Total SGEI Houses	This variable represents the total amount of homes that the social housing associations possess in the region in question.
	SGEI Houses Shortage	*House*	Total Low Income Household Demand - Total SGEI Houses	This variable represents the amount of additional SGEI houses that are required to satisfy the housing demand of households with low incomes
	Total SGEI Houses	*House*	SGEI Houses under Construction + SUM(SGEI Houses[AgeGroups!,ConditionScore!])	This variable represents the total amount of SGEI homes owned by the social housing associations in the region in question, including those that are being built.
	SGEI Houses under Construction	*House*	INTEG (SGEI Planned Houses-Constructed SGEI Houses, Initial SGEI Houses under Construction)	This variable represents the amount of SGEI houses owned by the social housing associations that are being built in the region in question.
	Initial SGEI Houses under Construction	*House*	Total Initial Houses under Construction * SGEI Houses Devision * IF THEN ELSE(Houses Test Switch = 0 , 1 , IF THEN ELSE(Houses Test Switch = 1 , Extremely Low Houses Factor , 1))	This variable represents the amount of SGEI houses owned by the social housing associations that are being built at the start of the model in the region in question. This variable usually equals a proportion of Total Initial Houses under Construction, but in the execution of the extreme condition test, this value will be multiplied by either Extremely Low Houses Factor.

	SGEI Houses Devision	$Dmnl$	WITH LOOKUP (Time, ([(2012,0)-(2050,1)],(2012,0.968),(2020,0.94),(2030,0.92),(2050,0.9)))	This variable represents the percentage of SGEI houses among all the houses owned by social housing associations throughout the model run (Aedes, 2014; 2021).
	SGEI Planned Houses	$\frac{House}{Year}$	(SGEI Houses to be Planned/Average Shortage Reaction Time) * Positive Impact of Solvency Ratio on SGEI Houses * Focus Percentage on New Construction	This variable represents the proportion of SGEI houses that are scheduled to be build in the region in question by the social housing associations.
	Positive Impact of Solvency Ratio on SGEI Houses	$Dmnl$	WITH LOOKUP (Solvency Ratio, ([(0,0)-(1,1)],(0,0),(0.1,0),(0.15,0.3),(0.45,1),(1,1)))	This variable represents the positive impact that the solvency ratio has on SGEI houses, depending on iets value (Van Nieuwamerongen & Van Kalsbleek, 2020).
	SGEI Houses to be Planned	$House$	MIN(IF THEN ELSE(SGEI Houses Shortage >= 0 , SGEI Houses Shortage , 0), Available Capacity for SGEI Planned Houses)	This variable represents the amount of SGEI houses that can be scheduled to be built in the region in question purely based on the planning capacity set aside for SGEI houses.
	Available Capacity for SGEI Planned Houses	$House$	MAX(Total Planning Capacity for Social Housing * SGEI Houses Devision, 0)	This variable represents the amount of SGEI houses that are expected to be constructed in the region in question by the social housing associations.
	Total Planning Capacity for Social Housing	$House$	INTEG (Planning Capacity for Social Housing Increase-Total Planned Construction for Social Housing, Initial Total Planning Capacity for Social Housing)	This variable represents the total planning capacity designated for the development of social housing by the social housing associations in the region in question.
	Initial Total Planning Capacity for Social Housing	$House$	(Yearly Planning Capacity * Planning Intended for Social Housing Percentage)/Duration of Yearly Planning Capacity	This variable represents the total planning capacity designated for the development of social housing at the start of the model by the social housing associations in the region in question.
	Yearly Planning Capacity	$\frac{House}{Year}$	Planning Capacity from 2020 to 2030/Planning Capacity Period	This variable represents the annual planning capacity designated for housing development (including owner-occupied dwellings) in the region in question.
	Initial Total Planning Capacity	$House$	Yearly Planning Capacity * (FINAL TIME - INITIAL TIME)	This variable represents the total planning capacity designated for housing development (including owner-occupied dwellings) in the region in question at the start of the model.

	Total Planning Capacity	$House$	INTEG (-Total Planning Capacity Decrease, Initial Total Planning Capacity)	This variable represents the total planning capacity designated for housing development (including owner-occupied dwellings) in the region in question.
	Total Planning Capacity Decrease	$\frac{House}{Year}$	Yearly Planning Capacity	This variable represents the annual planning capacity designated for housing development in the region in question that is actually built.
	Planning Capacity for Social Housing	$\frac{House}{Year}$	Total Planning Capacity Decrease * Planning Intended for Social Housing Percentage	This variable represents the portion of the annual planning capacity that is designated for social housing development that is actually scheduled to be built in the region in question.
	Planning Capacity for Social Housing Increase	$\frac{House}{Year}$	Planning Capacity for Social Housing + Total Demolished Houses	This variable represents the amount of houses by which the total planning capacity designated for the development of social housing by the social housing associations increases.
	Total Demolished Houses	$\frac{House}{Year}$	SUM(Demolished SGEI Houses[AgeGroups!,Score 6] + Demolished Non SGEI Houses[AgeGroups!,Score 6])	This variable represents the total amount of houses that are being demolished by the social housing associations in the region in question
	Total Planned Construction for Social Housing	$\frac{House}{Year}$	SGEI Planned Houses + Non SGEI Planned Houses	This variable represents the total amount of houses that are scheduled to be built by the social housing associations in the region in question
	Constructed SGEI Houses	$\frac{House}{Year}$	DELAY3I(SGEI Planned Houses , Average Construction Time , (SGEI Houses under Construction/Average Construction Time))	This variable represents the amount of SGEI houses that have been built by the social housing associations in the region in question.
	SGEI Houses	$House$	SGEI Houses[Age0to4, Score 1] = INTEG (Constructed SGEI Houses-SGEI Ageing[Age0to4, Score 1]-Sold SGEI Houses[Age0to4, Score 1] - Liberalized SGEI Houses[Age0to4, Score 1]-SGEI Houses Degradation[Age0to4,Score 1], Initial SGEI Housing[Age0to4, Score 1])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that are the youngest and have the best condition score.
			SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 1] = INTEG (SGEI Ageing[PreviousAgeGroup, Score 1] - SGEI Ageing[AllButYoungestAndOldestAgeGroup, Score 1]- Sold SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 1] - Liberalized SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 1] - SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup,Score 1], Initial SGEI Housing[AllButYoungestAndOldestAgeGroup, Score 1])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that have the best condition score but are neither the youngest nor the oldest.

			SGEI Houses[Age80plus, Score 1] = INTEG (SGEI Ageing[Age75to79, Score 1] - Sold SGEI Houses[Age80plus, Score 1] - Liberalized SGEI Houses [Age80plus, Score 1] - SGEI Houses Degradation[Age80plus,Score 1], Initial SGEI Housing[Age80plus, Score 1])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that are the oldest and have the best condition score.
			SGEI Houses[Age0to4,AllButBestAndWorstConditionRange] = INTEG (Constructed SGEI Houses-SGEI Ageing[Age0to4, AllButBestAndWorstConditionRange] - Sold SGEI Houses[Age0to4, AllButBestAndWorstConditionRange] - Liberalized SGEI Houses[Age0to4, AllButBestAndWorstConditionRange] + SGEI Houses Degradation [Age0to4,PreviousConditionRange] - SGEI Houses Degradation [Age0to4,AllButBestAndWorstConditionRange] + SGEI Houses Minor Maintenance [Age0to4,PreviousMinorMaintenanceRange] - SGEI Houses Minor Maintenance[Age0to4,AllButBestAndWorstConditionRange] - SGEI Houses Major Maintenance[Age0to4,AllButBestAndWorstConditionRange] + SGEI Houses Finished Major Maintenance [Age0to4, AllButBestAndWorstConditionRange], Initial SGEI Housing [Age0to4, AllButBestAndWorstConditionRange])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that are the youngest and have neither the best nor the worst condition score.
			SGEI Houses [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] = INTEG (SGEI Ageing [PreviousAgeGroup, AllButBestAndWorstConditionRange] - SGEI Ageing [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] - Sold SGEI Houses[AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] - Liberalized SGEI Houses [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] + SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup, PreviousConditionRange] - SGEI Houses Degradation [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] + SGEI Houses Minor Maintenance[Age0to4,PreviousMinorMaintenanceRange] - SGEI Houses Minor Maintenance [Age0to4, AllButBestAndWorstConditionRange] - SGEI Houses Major Maintenance [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] + SGEI Houses Finished Major Maintenance [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange], Initial SGEI Housing[AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that have neither the best nor the worst condition score but are neither the youngest nor the oldest.
			SGEI Houses[Age80plus,AllButBestAndWorstConditionRange] = INTEG (SGEI Ageing[Age75to79, AllButBestAndWorstConditionRange] - Sold SGEI Houses[Age80plus, AllButBestAndWorstConditionRange] - Liberalized SGEI Houses[Age80plus, AllButBestAndWorstConditionRange] + SGEI Houses Degradation[Age80plus, PreviousConditionRange] - SGEI Houses Degradation[Age80plus,AllButBestAndWorstConditionRange] + SGEI Houses Minor Maintenance[Age0to4, PreviousMinorMaintenanceRange] - SGEI Houses Minor Maintenance[Age0to4, AllButBestAndWorstConditionRange] - SGEI Houses Major Maintenance[Age80plus, AllButBestAndWorstConditionRange] + SGEI Houses Finished Major	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that are the oldest and have neither the best nor the worst condition score.

			Maintenance [Age80plus, AllButBestAndWorstConditionRange], Initial SGEI Housing[Age80plus, AllButBestAndWorstConditionRange])	
			SGEI Houses[Age0to4,Score 6] = INTEG (Constructed SGEI Houses-SGEI Ageing[Age0to4, Score 6]-Demolished SGEI Houses[Age0to4, Score 6]-Sold SGEI Houses[Age0to4, Score 6] + SGEI Houses Degradation[Age0to4,Score 5] - SGEI Houses Degradation[Age0to4,Score 6] - SGEI Houses Minor Maintenance[Age0to4,Score 6] - SGEI Houses Major Maintenance[Age0to4,Score 6] + SGEI Houses Finished Major Maintenance[Age0to4,Score 6], Initial SGEI Housing[Age0to4, Score 6])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that are the oldest and have the worst condition score.
			SGEI Houses[AllButYoungestAndOldestAgeGroup,Score 6] = INTEG (SGEI Ageing[PreviousAgeGroup, Score 6] - SGEI Ageing[AllButYoungestAndOldestAgeGroup, Score 6] - Demolished SGEI Houses [AllButYoungestAndOldestAgeGroup, Score 6] - Sold SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 6] + SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup,Score 5] - SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup,Score 6] - SGEI Houses Minor Maintenance[AllButYoungestAndOldestAgeGroup,Score 6] - SGEI Houses Major Maintenance [AllButYoungestAndOldestAgeGroup,Score 6] + SGEI Houses Finished Major Maintenance[AllButYoungestAndOldestAgeGroup, Score 6], Initial SGEI Housing[AllButYoungestAndOldestAgeGroup, Score 6])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that have the worst condition score but are neither the youngest nor the oldest.
			SGEI Houses[Age80plus,Score 6] = INTEG (SGEI Ageing[Age75to79, Score 6]-Demolished SGEI Houses[Age80plus, Score 6] - Sold SGEI Houses[Age80plus, Score 6] + SGEI Houses Degradation[Age80plus,Score 5] - SGEI Houses Degradation[Age80plus,Score 6] - SGEI Houses Minor Maintenance[Age80plus,Score 6] - SGEI Houses Major Maintenance[Age80plus,Score 6] + SGEI Houses Finished Major Maintenance[Age80plus,Score 6], Initial SGEI Housing[Age80plus, Score 6])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question that are the oldest and have the worst condition score.
	Initial SGEI Housing [AgeGroups, ConditionScore]	*House*	(Initial Total SGEI Housing * SGEI Housing Age Group Rate[AgeGroups]) * Housing Condition Score Rate[AgeGroups,ConditionScore]	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question at the start of the model.
	Housing Condition Score Rate [AgeGroups, ConditionScore]	*Dmnl*	((1-Section of Age Cohort ID[AgeGroups]) * (Age0to4 Lookup[ConditionScore]/SUM(Age0to4 Lookup[ConditionScore!])) + Section of Age Cohort ID[AgeGroups] * (Age80plus Lookup[ConditionScore]/SUM(Age80plus Lookup[ConditionScore!]))	This variable presentens the proportion of the total number of houses in a specific condition score.
	Section of Age Cohort ID [AgeGroups]	*Dmnl*	ZIDZ(Age Cohort ID[AgeGroups] , Age Cohort ID[Age80plus])	This variable represents a specific number range by which a couple of age groups are identified in the model.

	Age80plus Lookup [ConditionScore]	$Dmnl$	WITH LOOKUP (Average Age per Condition Score[ConditionScore], ([(4,0)-(55,1)],(4.5,0),(14.5,0.2),(24.5,0.4),(44.5,0.4),(54.5,1)))	This variable represents how the scores for the housing conditions are distributed among the oldest homes.
	Age0to4 Lookup [ConditionScore]	$Dmnl$	WITH LOOKUP (Average Age per Condition Score[ConditionScore], ([(4,0)-(55,1)],(4.5,1),(14.5,1),(24.5,0.5),(34.5,0),(54.5,0)))	This variable represents how the scores for the housing conditions are distributed among the youngest homes.
	SGEI Ageing [AgeGroups, ConditionScore]	$\frac{House}{Year}$	SGEI Houses[AgeGroups,ConditionScore]/Average Time per Age Group	This variable represents the proportion of the existing SGEI houses that are getting older, and are thus moving up to a higher age group.
	SGEI Houses Degradation [AgeGroups, ConditionScore]	$\frac{House}{Year}$	SGEI Houses[AgeGroups,ConditionScore]/Average Time per Condition Score	This variable represents the proportion of the existing SGEI houses that are deteriorating, and are thus moving up to a higher condition score.
	Demolished SGEI Houses [AgeGroups,Score 6]	$\frac{House}{Year}$	SGEI Houses[AgeGroups,Score 6] * Demolition Rate[AgeGroups]	This variable represents the proportion of the existing SGEI houses that are demolished by the social housing associations in the region in question per age group.
	Demolition Rate [AgeGroups]	$\frac{Dmnl}{Year}$	WITH LOOPUP (Average Age Per Age Group[AgeGroups], ([(0,0)-(100,1)],(0,0),(52.5,0),(70,1),(100,1)))	This variable represents the percentage of the houses that are demolished by the social housing associations in the region in question based on their age group.
	Sold SGEI Houses [AgeGroups, ConditionScore]	$\frac{House}{Year}$	Negative Impact of Solvency Ratio on SGEI Houses * Sold Rate[AgeGroups] * SGEI Houses[AgeGroups,ConditionScore]	This variable represents the proportion of the existing SGEI houses that are sold to a third party by the social housing associations in the region in question per age group and condition score.
	Negative Impact of Solvency Ratio on SGEI Houses	$Dmnl$	WITH LOOKUP (Solvency Ratio, ([(0,0)-(1,1)],(0,1),(0.1,1),(0.15,0.5),(0.45,0.3),(1,0)))	This variable represents the negative impact that the solvency ratio has on SGEI houses, depending on iets value (Van Nieuwamerongen & Van Kalsbleek, 2020).
	SGEI Houses Minor Maintenance [AgeGroups ,MaintenanceRange]	$\frac{House}{Year}$	Positive Impact of Solvency Ratio on SGEI Houses * (1 - Focus Percentage on New Construction) * (SGEI Houses[AgeGroups, MaintenanceRange] * Minor Maintenance Percentage[MaintenanceRange])	This variable represents the proportion of the existing SGEI houses that undergo minor maintenance by the social housing associations in the region in question.
	Minor Maintenance Percentage [MaintenanceRange]	$\frac{Dmnl}{Year}$	Expected Minor Maintenance Percentage[MaintenanceRange] * (1 - Focus Percentage on Major Maintenance)	This variable represents the percentage of the existing SGEI houses that can undergo minor maintenance by the social housing associations in the region in question based on their condition score.

	SGEI Houses Major Maintenance [AgeGroups, MaintenanceRange]	$\frac{House}{Year}$	Positive Impact of Solvency Ratio on SGEI Houses * (1 - Focus Percentage on New Construction) * (SGEI Houses[AgeGroups, MaintenanceRange] * Major Maintenance Percentage [MaintenanceRange])	This variable represents the proportion of the existing SGEI houses that undergo major maintenance by the social housing associations in the region in question.
	Major Maintenance Percentage [MaintenanceRange]	$\frac{Dmnl}{Year}$	Expected Major Maintenance Percentage[MaintenanceRange] * Focus Percentage on Major Maintenance	This variable represents the percentage of the existing SGEI houses that can undergo major maintenance by the social housing associations in the region in question based on their condition score.
	SGEI Houses Finished Major Maintenance [AgeGroups, MaintenanceRange]	$\frac{House}{Year}$	DELAY3I(SUM(SGEI Houses Major Maintenance[AgeGroups, MaintenanceRange!]) * Major Maintenance Devision[MaintenanceRange] , Major Maintenance Delay, SUM(SGEI Houses Major Maintenance [AgeGroups,MaintenanceRange!]) * Major Maintenance Devision [MaintenanceRange])	This variable represents the proportion of the existing SGEI houses that have finished receiving major maintenance by the social housing associations in the region in question.
	Liberalized SGEI Houses [AgeGroups, AllButWorst-ConditionRange]	$\frac{House}{Year}$	(SGEI Houses[AgeGroups,AllButWorstConditionRange] * Liberalisation Rate[AgeGroups])*PULSE TRAIN(INITIAL TIME , TIME STEP, 1 , FINAL TIME)	This variable represents the proportion of the existing SGEI Houses that will be rented out at a higher rate by the social housing associations in the region in question.
	Liberalisation Rate [AgeGroups]	$\frac{Dmnl}{Year}$	WITH LOOKUP (Average Age Per Age Group[AgeGroups], ([(0,0)-(100,0.2)],(0,0),(9,0),(45,0.1),(70,0),(100,0)))	This variable represents the percentage of the existing SGEI Houses that can be rented out at a higher rate by the social housing associations in the region in question based on their age.
	Age SGEI Houses [AgeGroups]	$House$	SUM(SGEI Houses[AgeGroups,ConditionScore!])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question per age group.
	Condition Score SGEI Houses [ConditionScore]	$House$	SUM(SGEI Houses[AgeGroups!,ConditionScore])	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question per condition score.
	Total Demolished SGEI Houses	$\frac{House}{Year}$	SUM(Demolished SGEI Houses[AgeGroups!,Score 6])	This variable represents the proportion of the existing SGEI houses that are demolished by the social housing associations in the region in question.
	Total Sold SGEI Houses	$\frac{House}{Year}$	SUM(Sold SGEI Houses[AgeGroups!,ConditionScore!])	This variable represents the proportion of the existing SGEI houses that are sold to a third party by the social housing associations in the region in question.

	Non SGEI Houses Shortage	$House$	Total Low Middle Income Household Demand - Total Non SGEI Houses	This variable represents the amount of additional Non SGEI houses that are required to satisfy the housing demand of households with middle-low incomes.
	Total Non SGEI Houses	$House$	Non SGEI Houses under Construction + SUM(Non SGEI Houses[AgeGroups!,ConditionScore!])	This variable represents the total amount of Non SGEI homes owned by the social housing associations in the region in question, including those that are being built.
	Non SGEI Houses under Construction	$House$	INTEG (Non SGEI Planned Houses-Constructed Non SGEI Houses, Initial Non SGEI Houses under Construction)	This variable represents the amount of Non SGEI houses owned by the social housing associations that are being built in the region in question.
	Initial Non SGEI Houses under Construction	$House$	Total Initial Houses under Construction * (1-SGEI Houses Devision) * IF THEN ELSE(Houses Test Switch = 0 , 1 , IF THEN ELSE(Houses Test Switch = 1 , Extremely Low Houses Factor , 1))	This variable represents the amount of Non SGEI houses owned by the social housing associations that are being built at the start of the model in the region in question. This variable usually equals a proportion of Total Initial Houses under Construction, but in the execution of the extreme condition test, this value will be multiplied by either Extremely Low Houses Factor.
	Non SGEI Planned Houses	$\frac{House}{Year}$	(Non SGEI Houses to be Planned/Average Shortage Reaction Time) * Positive Impact of Solvency Ratio on Non SGEI Houses	This variable represents the proportion of Non SGEI houses that are scheduled to be build in the region in question by the social housing associations.
	Positive Impact of Solvency Ratio on Non SGEI Houses	$Dmnl$	WITH LOOKUP (Solvency Ratio, ([(0,0)-(1,1)],(0,0),(0.35,0),(0.4,0.3),(0.7,1),(1,1)))	This variable represents the positive impact that the solvency ratio has on Non SGEI houses, depending on iets value (Van Nieuwamerongen & Van Kalsbleek, 2020).
	Non SGEI Houses to be Planned	$House$	MIN(IF THEN ELSE(Non SGEI Houses Shortage >= 0 , Non SGEI Houses Shortage , 0), Available Capacity for Non SGEI Planned Houses)	This variable represents the amount of Non SGEI houses that can be scheduled to be built in the region in question purely based on the planning capacity set aside for SGEI houses.
	Available Capacity for Non SGEI Planned Houses	$House$	MAX(Total Planning Capacity for Social Housing * (1-SGEI Houses Devision), 0)	This variable represents the amount of Non SGEI houses that are expected to be constructed in the region in question by the social housing associations.

	Constructed Non SGEI Houses	$\frac{House}{Year}$	DELAY3I(Non SGEI Planned Houses , Average Construction Time , (Non SGEI Houses under Construction/Average Construction Time))	This variable represents the amount of Non SGEI houses that have been built by the social housing associations in the region in question.
	Non SGEI Houses	*House*	Non SGEI Houses [Age0to4, Score 1] = INTEG (Constructed Non SGEI Houses-Non SGEI Ageing[Age0to4, Score1]-Sold Non SGEI Houses[Age0to4, Score 1] + Liberalized SGEI Houses[Age0to4, Score 1]-Non SGEI Houses Degradation[Age0to4,Score 1], Initial Non SGEI Housing[Age0to4, Score 1])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that are the youngest and have the best condition score.
			Non SGEI Houses [AllButYoungestAndOldestAgeGroup, Score 1] = INTEG (Non SGEI Ageing[PreviousAgeGroup, Score 1] - Non SGEI Ageing[AllButYoungestAndOldestAgeGroup, Score 1] - Sold Non SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 1] + Liberalized SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 1] - Non SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup,Score 1], Initial Non SGEI Housing[AllButYoungestAndOldestAgeGroup, Score 1])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that have the best condition score but are neither the youngest nor the oldest.
			Non SGEI Houses [Age80plus, Score 1] = INTEG (Non SGEI Ageing[Age75to79, Score 1] - Sold Non SGEI Houses [Age80plus, Score 1] + Liberalized SGEI Houses[Age80plus, Score 1] - Non SGEI Houses Degradation [Age80plus,Score 1], Initial Non SGEI Housing[Age80plus, Score 1])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that are the oldest and have the best condition score.
			Non SGEI Houses [Age0to4,AllButBestAndWorstConditionRange] = INTEG (Constructed Non SGEI Houses-Non SGEI Ageing[Age0to4, AllButBestAndWorstConditionRange] - Sold Non SGEI Houses[Age0to4, AllButBestAndWorstConditionRange] + Liberalized SGEI Houses [Age0to4,AllButBestAndWorstConditionRange] + Non SGEI Houses Degradation[Age0to4,PreviousConditionRange] - Non SGEI Houses Degradation[Age0to4,AllButBestAndWorstConditionRange] + Non SGEI Houses Minor Maintenance[Age0to4,PreviousMinorMaintenanceRange] - Non SGEI Houses Minor Maintenance[Age0to4, AllButBestAndWorstConditionRange] - Non SGEI Houses Major Maintenance[Age0to4,AllButBestAndWorstConditionRange] + Non SGEI Houses Finished Major Maitenance[Age0to4, AllButBestAndWorstConditionRange], Initial Non SGEI Housing[Age0to4, AllButBestAndWorstConditionRange])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that are the youngest and have neither the best nor the worst condition score.
			Non SGEI Houses [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] = INTEG (Non SGEI Ageing[PreviousAgeGroup, AllButBestAndWorstConditionRange] - Non SGEI Ageing[AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] - Sold Non SGEI Houses[AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] + Liberalized SGEI	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that have neither the best nor the worst condition score but are neither the youngest nor the oldest.

			Houses[AllButYoungestAndOldestAgeGroup,AllButBestAndWorstConditionRange] + Non SGEI Houses Degradation [AllButYoungestAndOldestAgeGroup,PreviousConditionRange] - Non SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] + Non SGEI Houses Minor Maintenance[Age0to4,PreviousMinorMaintenanceRange] - Non SGEI Houses Minor Maintenance[Age0to4, AllButBestAndWorstConditionRange] - Non SGEI Houses Major Maintenance [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange] + Non SGEI Houses Finished Major Maitenance[AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange], Initial Non SGEI Housing [AllButYoungestAndOldestAgeGroup, AllButBestAndWorstConditionRange])	
			Non SGEI Houses [Age80plus,AllButBestAndWorstConditionRange] = INTEG (Non SGEI Ageing[Age75to79, AllButBestAndWorstConditionRange] - Sold Non SGEI Houses[Age80plus, AllButBestAndWorstConditionRange] + Liberalized SGEI Houses [Age80plus,AllButBestAndWorstConditionRange] + Non SGEI Houses Degradation[Age80plus,PreviousConditionRange] - Non SGEI Houses Degradation[Age80plus, AllButBestAndWorstConditionRange] + Non SGEI Houses Minor Maintenance [Age0to4,PreviousMinorMaintenanceRange] - Non SGEI Houses Minor Maintenance[Age0to4, AllButBestAndWorstConditionRange] - Non SGEI Houses Major Maintenance[Age80plus,AllButBestAndWorstConditionRange] + Non SGEI Houses Finished Major Maitenance[Age80plus, AllButBestAndWorstConditionRange], Initial Non SGEI Housing[Age80plus, AllButBestAndWorstConditionRange])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that are the oldest and have neither the best nor the worst condition score.
			Non SGEI Houses [Age0to4,Score 6] = INTEG (Constructed Non SGEI Houses-Non SGEI Ageing[Age0to4, Score 6] - Sold Non SGEI Houses[Age0to4, Score 6] + Non SGEI Houses Degradation[Age0to4,Score 5] - Non SGEI Houses Degradation [Age0to4,Score 6] - Non SGEI Houses Minor Maintenance[Age0to4,Score 6] - Demolished Non SGEI Houses[Age0to4,Score 6] - Non SGEI Houses Major Maintenance[Age0to4,Score 6] + Non SGEI Houses Finished Major Maitenance[Age0to4,Score 6], Initial Non SGEI Housing[Age0to4, Score 6])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that are the oldest and have the worst condition score.
			Non SGEI Houses [AllButYoungestAndOldestAgeGroup,Score 6] = INTEG (Non SGEI Ageing[PreviousAgeGroup, Score 6] - Non SGEI Ageing[AllButYoungestAndOldestAgeGroup, Score 6] - Demolished Non SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 6] - Sold Non SGEI Houses[AllButYoungestAndOldestAgeGroup, Score 6] + Non SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup,Score 5] - Non SGEI Houses Degradation[AllButYoungestAndOldestAgeGroup,Score 6] - Non SGEI Houses Minor Maintenance [AllButYoungestAndOldestAgeGroup,Score 6] - Non SGEI Houses Major Maintenance[AllButYoungestAndOldestAgeGroup,Score 6] + Non SGEI Houses Finished Major Maitenance [AllButYoungestAndOldestAgeGroup, Score 6], Initial Non SGEI Housing[AllButYoungestAndOldestAgeGroup, Score 6])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that have the worst condition score but are neither the youngest nor the oldest.

			Non SGEI Houses [Age80plus,Score 6] = INTEG (Non SGEI Ageing[Age75to79, Score 6]-Demolished Non SGEI Houses[Age80plus, Score 6] - Sold Non SGEI Houses[Age80plus, Score 6] + Non SGEI Houses Degradation[Age80plus,Score 5] - Non SGEI Houses Degradation[Age80plus,Score 6] - Non SGEI Houses Minor Maintenance[Age80plus,Score 6] - Non SGEI Houses Major Maintenance[Age80plus,Score 6] + Non SGEI Houses Finished Major Maitenance [Age80plus,Score 6], Initial Non SGEI Housing[Age80plus, Score 6])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question that are the oldest and have the worst condition score.
	Initial Non SGEI Housing [AgeGroups,ConditionScore]	$House$	(Initial Total Non SGEI Housing * Non SGEI Housing Age Group Rate[AgeGroups]) * Housing Condition Score Rate[AgeGroups,ConditionScore]	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question at the start of the model.
	Non SGEI Ageing [AgeGroups, ConditionScore]	$\frac{House}{Year}$	Non SGEI Houses[AgeGroups,ConditionScore]/Average Time per Age Group	This variable represents the proportion of the existing Non SGEI houses that are getting older, and are thus moving up to a higher age group.
	Non SGEI Houses Degradation [AgeGroups, ConditionScore]	$\frac{House}{Year}$	Non SGEI Houses[AgeGroups,ConditionScore]/Average Time per Condition Score	This variable represents the proportion of the existing Non SGEI houses that are deteriorating, and are thus moving up to a higher condition score.
	Sold Non SGEI Houses [AgeGroups,ConditionScore]	$\frac{House}{Year}$	Negative Impact of Solvency Ratio on Non SGEI Houses * Sold Rate[AgeGroups] * Non SGEI Houses[AgeGroups,ConditionScore]	This variable represents the proportion of the existing Non SGEI houses that are sold to a third party by the social housing associations in the region in question per age group and condition score.
	Negative Impact of Solvency Ratio on Non SGEI Houses	$Dmnl$	WITH LOOKUP (Solvency Ratio, ([(0,0)-(1,1)],(0,1),(0.35,1),(0.4,0.5),(0.7,0.3),(1,0)))	This variable represents the negative impact that the solvency ratio has on Non SGEI houses, depending on iets value (Van Nieuwamerongen & Van Kalsbleek, 2020).
	Demolished Non SGEI Houses [AgeGroups,Score 6]	$\frac{House}{Year}$	Non SGEI Houses[AgeGroups,Score 6] * Demolition Rate[AgeGroups]	This variable represents the proportion of the existing Non SGEI houses that are demolished by the social housing associations in the region in question per age group.
	Non SGEI Houses Minor Maintenance [AgeGroups, MaintenanceRange]	$\frac{House}{Year}$	Positive Impact of Solvency Ratio on Non SGEI Houses * (1 - Focus Percentage on New Construction) * (Non SGEI Houses[AgeGroups ,MaintenanceRange] * Minor Maintenance Percentage[MaintenanceRange])	This variable represents the proportion of the existing Non SGEI houses that undergo minor maintenance by the social housing associations in the region in question.

	Non SGEI Houses Major Maintenance [AgeGroups, MaintenanceRange]	$\frac{House}{Year}$	Positive Impact of Solvency Ratio on Non SGEI Houses * (1 - Focus Percentage on New Construction) * (Non SGEI Houses[AgeGroups ,MaintenanceRange] * Major Maintenance Percentage [MaintenanceRange])	This variable represents the proportion of the existing Non SGEI houses that undergo major maintenance by the social housing associations in the region in question.
	Non SGEI Houses Finished Major Maitenance [AgeGroups, MaintenanceRange]	$\frac{House}{Year}$	DELAY3I(SUM(Non SGEI Houses Major Maintenance[AgeGroups, MaintenanceRange!]) * Major Maintenance Devision[MaintenanceRange], Major Maintenance Delay, SUM(Non SGEI Houses Major Maintenance[AgeGroups, MaintenanceRange!]) * Major Maintenance Devision[MaintenanceRange])	This variable represents the proportion of the existing Non SGEI houses that have finished receiving major maintenance by the social housing associations in the region in question
	Age Non SGEI Houses [AgeGroup]	*House*	SUM(Non SGEI Houses[AgeGroups,ConditionScore!])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question per age group.
	Condition Score Non SGEI Houses [ConditionScore]	*House*	SUM(Non SGEI Houses[AgeGroups!,ConditionScore])	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question per condition score.
	Total Demolished Non SGEI Houses	$\frac{House}{Year}$	SUM(Demolished Non SGEI Houses[AgeGroups!,Score 6])	This variable represents the proportion of the existing Non SGEI houses that are demolished by the social housing associations in the region in question.
	Total Sold Non SGEI Houses	$\frac{House}{Year}$	SUM(Sold Non SGEI Houses[AgeGroups!,ConditionScore!])	This variable represents the proportion of the existing Non SGEI houses that are sold to a third party by the social housing associations in the region in question.
	Average Condition Score of SGEI Houses	$\frac{Dmnl}{House}$	SUM(Total Condition Score of SGEI Houses[ConditionScore!])/ SUM(SGEI Houses[AgeGroups!,ConditionScore!])	This variable represents the average score for the SGEI Houses condition in this region.
	Total Condition Score of SGEI Houses [ConditionScore]	*Dmnl*	SUM(SGEI Houses[AgeGroups!,ConditionScore]) * Condition Score[ConditionScore]	This variable represents the total score for the SGEI Houses condition in this region, by adding all the condition scores of these houses together per condition score.
	Average Condition Score of Non SGEI Houses	$\frac{Dmnl}{House}$	SUM(Total Condition Score of Non SGEI Houses[ConditionScore!])/ SUM(Non SGEI Houses[AgeGroups!,ConditionScore!])	This variable represents the average score for the Non SGEI Houses condition in this region.
	Total Condition Score of Non SGEI Houses [ConditionScore]	*Dmnl*	SUM(Non SGEI Houses[AgeGroups!,ConditionScore]) * Condition Score[ConditionScore]	This variable represents the total score for the Non SGEI Houses condition in this region, by adding all the condition scores of these houses together per condition score.

Economic	Social Housing Providers Balance	$Euro$	INTEG (Housing Income+New Loans+Subsidy)-(Interest+Housing Expenses+Taxes+ Loan Payments, Initial Social Housing Providers Balance)	This variable represents the cash flow balance of the social housing associations in the region in question.
	Housing Income	$\frac{Euro}{Year}$	Rental Income + Netto Sales Income + New Loan + Total Subsidy	This variable represents the total income of the social housing associations, by adding the Rental Income, Netto Sales Income, New Loan, and Total Subsidy together.
	Netto Sales Income	$\frac{Euro}{Year}$	((SUM(Sold Non SGEI Houses[AgeGroups!,ConditionScore!]) + SUM(Sold SGEI Houses[AgeGroups!,ConditionScore!]))*Average WOZ Value) * (1-Cost of Sales)	This variable represents the total revenue of the social housing associations from selling a portion of their houses in the region in question.
	Average WOZ Value	$\frac{Euro}{House}$	INTEG (House Value Increase, Initial Average WOZ Value)	This variable represents the average WOZ value per house owned by the social housing associations in the region in question.
	House Value Increase	$\frac{Euro}{House * Year}$	Average WOZ Value * Average WOZ Value Alteration	This variable represents the proportion by whitch the average WOZ value per house increases in this model.
	Average WOZ Value Alteration	$\frac{Dmnl}{Year}$	SMOOTH3(Average WOZ Value Increase Percentage * Shortage Mutation ,Information Delay)	This variable represents the the percentage by whitch the average WOZ value per house increases in this model.
	Shortage Mutation	$Dmnl$	((Totale House Shortage - Previous Total House Shortage) / Previous Total House Shortage)/Examination Time of Total House Shortage	This variable represents the discrepancy between the current and previous total housing shortage in the region in question.
	Previous Total House Shortage	$House$	DELAY FIXED (Totale House Shortage , Examination Time of Total House Shortage , Totale House Shortage)	This variable represents the amount of total housing shortage in the region in question at the previous examination time.
	Totale House Shortage	$House$	SGEI Houses Shortage + Non SGEI Houses Shortage	This variable represents the total amount of additional houses that are required from the social housing associations in order to meet the housing demand in the region in question.
	Rental Income	$\frac{Euro}{Year}$	((SUM(SGEI Houses[AgeGroups!,ConditionScore!]) * Average SGEI Houses Rent) + (SUM(Non SGEI Houses[AgeGroups!,ConditionScore!]) *Average Non SGEI Houses Rent)) * Time Correction * (1 - Vacancy Rate)	This variable represents the total revenue that the social housing associations earn from renting their properties alone.
	Average SGEI Houses Rent	$\frac{Euro}{House * Month}$	INTEG (SGEI Houses Rent Increase, Initial Average SGEI Houses Rent)	This variable represents the average rental price per SGEI houses that are owned by the social housing associations in the region in question.

	SGEI Houses Rent Increase	$\frac{Euro}{House * Month * Year}$	Average SGEI Rent Increase Alteration * Average SGEI Houses Rent	This variable represents the proportion by which the average rental price per SGEI houses that are owned by the social housing associations increases in the region in question.
	Average SGEI Rent Increase Alteration	$\frac{Dmnl}{Year}$	Negative Impact of Solvency Ratio on SGEI Houses * IF THEN ELSE(Time > 2022 , Average Rent Increase Percentage , Initial Average Rent Increase Perentage)	This variable represents the percentage increase or decrease in the average rental price per SGEI houses that are owned by the social housing associations in the region in question.
	Average Non SGEI Houses Rent	$\frac{Euro}{House * Month}$	INTEG (Non SGEI Houses Rent Increase, Initial Average Non SGEI Houses Rent)	This variable represents the average rental price per Non SGEI houses that are owned by the social housing associations in the region in question.
	Non SGEI Houses Rent Increase	$\frac{Euro}{House * Month * Year}$	Average Non SGEI Rent Increase Alteration * Average Non SGEI Houses Rent	This variable represents the proportion by which the average rental price per Non SGEI houses that are owned by the social housing associations increases in the region in question.
	Average Non SGEI Rent Increase Alteration	$\frac{Dmnl}{Year}$	Negative Impact of Solvency Ratio on Non SGEI Houses * IF THEN ELSE(Time > 2022 , Average Rent Increase Percentage , Initial Average Rent Increase Perentage)	This variable represents the percentage increase or decrease in the average rental price per Non SGEI houses that are owned by the social housing associations in the region in question.
	Solvency Ratio	$Dmnl$	MIN(MAX(ZIDZ(Equity - Debt, Equity), 0), 1)	This variable represents the solvency ratio of the social housing associations in the region in question. This variable can only have a value in the range of 0 and 1 in this model.
	Equity	$Euro$	Total WOZ Value of SGEI Houses + Total WOZ Value of Non SGEI Houses	This variable represents the balance of the housing assets owned by the social housing associations in the region in question.
	Debt	$Euro$	INTEG (Balance Correction Loan+Housing Loan-Loan Repayment, Initial Debt)	This variable represents the total amount of loans taken by the social housing associations in the region in question.
	Initial Debt	$Euro$	(1 - Initial Solvency Ratio) * Equity	This variable represents the total amount of loans taken by the social housing associations in the region in question at the start of the model.
	Housing Loan	$\frac{Euro}{Year}$	Total Foundation Costs + Total Maintenance Costs - Total Subsidy	This variable represents the total amount of loans taken by the social housing associations in the region in question.

	Total Subsidy	$\frac{Euro}{Year}$	SGEI Planned Houses * IF THEN ELSE(Time > 2022 , Subsidy per SGEI House , Initial Subsidy per SGEI Houses)	This variable represents the total amount of subsidies that social housing associations receive for building SGEI houses.
	Balance Correction Loan	$\frac{Euro}{Year}$	IF THEN ELSE(Social Housing Providers Balance < 0 , Expected Balance Change , 0)	This variable represents the amount of additional loans that must be taken out to prevent the social housing associations from going into the red (higer expenses that income).
	Expected Balance Change	$\frac{Euro}{Year}$	DELAY FIXED(ABS(Total Income - Total Expenses) , Expected Change Delay , 0)	This variable represents the amount of additional money needed to prevent the social housing associations from going into the red (higer expenses that income).
	Total Expenses	$\frac{Euro}{Year}$	Housing Expenses + Interest + Taxes	This variable represents the total amount of money that the social housing associations spend to finance the housing developments in the region in question.
	Total Income	$\frac{Euro}{Year}$	Housing Income + New Loans + Subsidy	This variable represents the total amount of money that the social housing associations receive as income in the region in question.
	Loan Repayment	$\frac{Euro}{Year}$	Loan Payments	This variable represents the amount of money the social housing associations use to repay the loans they have made in the region in question.
	Loan Payments	$\frac{Euro}{Year}$	MAX(Total Income - Total Expenses, 0)	This variable represents the amount of money the social housing associations use to repay the loans they have made in the region in question if the association has made profit.
	Housing Expenses	$\frac{Euro}{Year}$	Total Construction Costs + Total Maintenance Costs + Total Organisational Costs	This variable represents the total expenses of the social housing associations, by adding the Total Construction Costs, Total Maintenance Costs, and Total Organisational Costs together.
	Total Organisational Costs	$\frac{Euro}{Year}$	Rental Income * B and O Percentage	This variable represents the portion of the rental income that goes toward social housing associations' management costs
	Total Construction Costs	$\frac{Euro}{Year}$	Total Foundation Costs + Demolition Costs	This variable represents the total amount of money that the social housing associations in the region in question uses to pay for the housing development.

	Demolition Costs	$\frac{Euro}{Year}$	SUM(Demolished SGEI Houses[AgeGroups!,Score 6] + Demolished Non SGEI Houses[AgeGroups!,Score 6]) * (Average Demolition Costs * Average Social House Size)	This variable represents the total amount of money that the social housing associations in the region in question uses to pay for the housing demolition.
	Total Foundation Costs	$\frac{Euro}{Year}$	(SGEI Planned Houses * Average Foundation Costs of SGEI Houses) + (Non SGEI Planned Houses * Average Foundation Costs of Non SGEI Houses)	This variable represents the total amount of money that the social housing associations in the region in question uses to pay for the construction of new houses.
	Total Maintenance Costs	$\frac{Euro}{Year}$	Total Minor Maintenance Costs + Total Major Maintenance Costs	This variable represents the total amount of money that the social housing associations in the region in question uses to pay for the housing maintenance.
	Total Major Maintenance Costs	$\frac{Euro}{Year}$	SUM(SGEI Houses Major Maintenance [AgeGroups!, MaintenanceRange!] + Non SGEI Houses Major Maintenance[AgeGroups!,MaintenanceRange!]) * Major Maintenance Costs	This variable represents the total amount of money that the social housing associations in the region in question uses to pay for the houses that undergo major maintenance.
	Major Maintenance Costs	$\frac{Euro}{House}$	Average Social House Construction Costs * Major Maintenance Cost Part	This variable represents the total amount of money that go toward carrying out major maintenance in the housing stock of the social housing associations in the region in question.
	Average Social House Construction Costs	$\frac{Euro}{House}$	Average Social House Size * IF THEN ELSE(Time < 2022 , Average Construction Costs , Average Construction Costs Assumption)	This variable represents the average costs to built a new social house by the social housing associations in the region in question.
	Average Construction Costs	$\frac{Euro}{m^2}$	WITH LOOKUP (Time, ([(2012,0)-(2050,400)],(2012,258),(2013,265),(2014,236),(2015,249),(2016,255),(2017,269),(2018,293),(2019,310),(2020,328),(2021,321),(2022,300),(2050,300)))	This variable represents the average costs to built a new house before 2022 in this model (Statista Research Department, 2022).
	Total Minor Maintenance Costs	$\frac{Euro}{Year}$	SUM(SGEI Houses Minor Maintenance[AgeGroups!,MaintenanceRange!] + Non SGEI Houses Minor Maintenance[AgeGroups!,MaintenanceRange!]) * Minor Maintenance Costs	This variable represents the total amount of money that the social housing associations in the region in question uses to pay for the houses that undergo minor maintenance.
	Minor Maintenance Costs	$\frac{Euro}{House}$	Average Social House Construction Costs* Minor Maintenance Cost Part	This variable represents the total amount of money that go toward carrying out minor maintenance in the housing stock of the social housing associations in the region in question.
	Taxes	$\frac{Euro}{Year}$	Landlord Lavy + Corporation Tax + Other Taxes	This variable represents the total amount of money that the social housing associations in the region in question uses to pay their taxes.

	Other Taxes	$\frac{Euro}{Year}$	IF THEN ELSE (Social Housing Providers Balance >= 0 , Social Housing Providers Balance * Tax Rate , 0)	This variable represents the amount of money that the social housing associations in the region in question uses to pay other taxes.
	Corporation Tax	$\frac{Euro}{Year}$	IF THEN ELSE (Social Housing Providers Balance >= Treshold Balance per Year , (Treshold Balance per Year * Corporation Tax Rate up to and including Treshold) + ((Social Housing Providers Balance - Treshold Balance per Year) * Corporation Tax Rate above Treshold) , IF THEN ELSE(Social Housing Providers Balance <= Treshold Balance per Year :AND: Social Housing Providers Balance >= 0, Social Housing Providers Balance * Corporation Tax Rate up to and including Treshold, 0))	This variable represents the amount of money that the social housing associations in the region in question uses to pay corporation taxes.
	Corporation Tax Rate above Treshold	$\frac{Dmnl}{Year}$	WITH LOOKUP (Time, ([(2012,0)-(2050,1)],(2012,0.25),(2019,0.25),(2020,0.25),(2021,0.25),(2022,0.258),(2030,0.25),(2050,0.25)))	This variable represents the amount of money the social housing associations need to pay in corporation taxes if their profit exeed the specified threshold (Taxel.nl, n.d;. Belastingdienst, n.d.)
	Treshold Balance per Year	$Euro$	WITH LOOKUP (Time, ([(2012,0)-(2050,500000)],(2012,200000),(2019,200000),(2020,200000),(2021,245000),(2022,395000),(2023,395000),(2050,395000)))	This variable represents the profit threshold that the social housing associations need in order to calculate the corporation taxes (Taxel.nl, n.d; Belastingdienst, n.d.)
	Corporation Tax Rate up to and including Threshold	$\frac{Dmnl}{Year}$	WITH LOOKUP (Time, ([(2012,0.1)-(2050,0.3)],(2012,0.2),(2019,0.2),(2019,0.19),(2020,0.165),(2021,0.15),(2022,0.15),(2050,0.15)))	This variable represents the amount of money the social housing associations need to pay in corporation taxes if their profit is below the specified threshold (Taxel.nl, n.d;. Belastingdienst, n.d.)
	Landlord Lavy	$\frac{Euro}{Year}$	Total WOZ Value of SGEI Houses * IF THEN ELSE(Time > 2022 , Landlord Lavy Percentage * Policy Alteration of Landlord Lavy Percentage , Landlord Lavy Percentage)	This variable represents the total amount of money that the social housing associations in the region in question uses to pay for landlord levy.
	Total WOZ Value of SGEI Houses	$Euro$	SUM(SGEI Houses[AgeGroups!,ConditionScore!]) * Average WOZ Value	This variable represents the amount of existing SGEI houses owned by the social housing associations in the region in question, expressed in money with the help of the WOZ value.
	Total WOZ Value of Non SGEI Houses	$Euro$	SUM(Non SGEI Houses[AgeGroups!,ConditionScore!]) * Average WOZ Value	This variable represents the amount of existing Non SGEI houses owned by the social housing associations in the region in question, expressed in money with the help of the WOZ value..

	Landlord Lavy Percentage	$\frac{Dmnl}{Year}$	WITH LOOKUP (Time, ([(2012,0.1)-(2050,0.3)],(2012,0.2),(2019,0.2),(2019,0.19),(2020,0.165),(2021,0.15),(2022,0.15),(2050,0.15)))	This variable represents the percentage that the social housing associations need in order to calculate the amount of money that is needed to pay the landlord levy (Tredius, 2013; Jongbloed Fiscaal Juristen, n.d.; Eijlders, 2018, 2019; Aedes n.d.).
	Interest	$\frac{Euro}{Year}$	Debt * Interest Rate	This variable represents the total amount of money that the social housing associations in the region in question uses to pay its interest.

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