



Introduction to Ventity

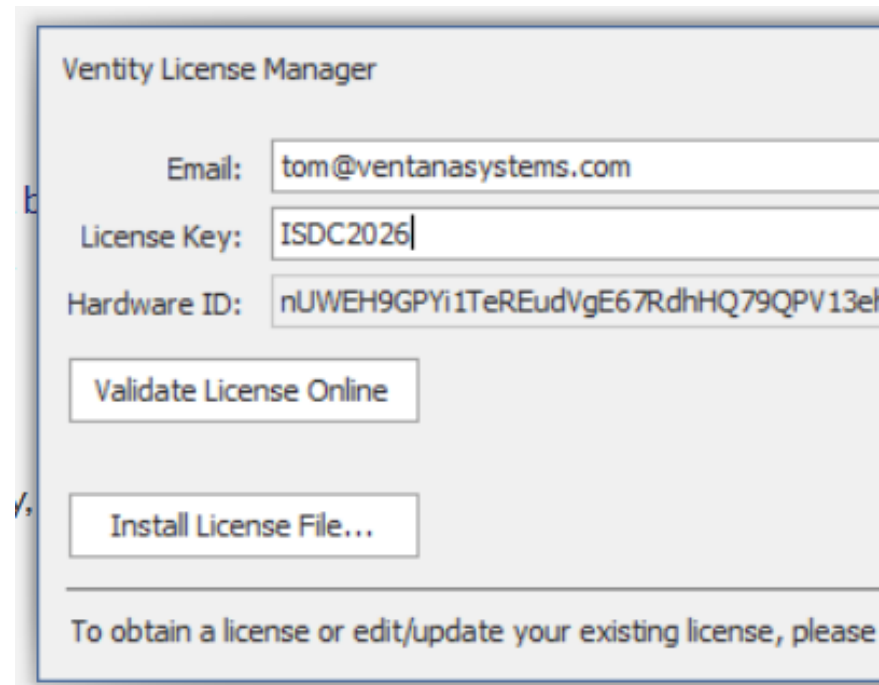
ISDC 2026

Agenda

- **Logistics**
- **Basics - Quickstart**
- **What goes where?**
- **Attributes, References & Relationships**
- **Data**
- **GIS**
- **Controls**
- **Actions**

Logistics

- **Download from**
<https://ventity.biz/download/>
- **Get a key from the form, or use ISDC2026 (through the end of August)**
- **Install the key when asked, or via Help>License Info**
- **Grab the course materials from**
<https://vensim.com/conference/> **and unzip somewhere convenient**



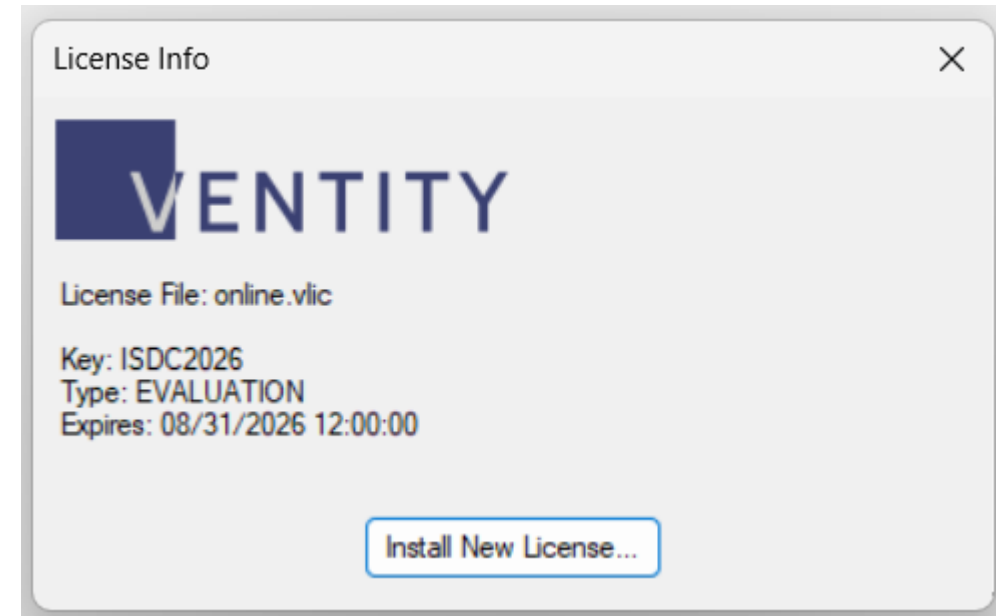
Ventity License Manager

Email:

License Key:

Hardware ID:

To obtain a license or edit/update your existing license, please



0. Basics

- **Orientation**
- **Start Ventity and create a new model**
- **Define your time horizon in the Run List**
- **Create a stock and flow**
- **Define equations**
- **Run**
- **Right-click to plot or view data**
- **Hint: when in doubt, right-click for context menus**

› 1 - What Goes Where ›

Name



BassArrayFinished



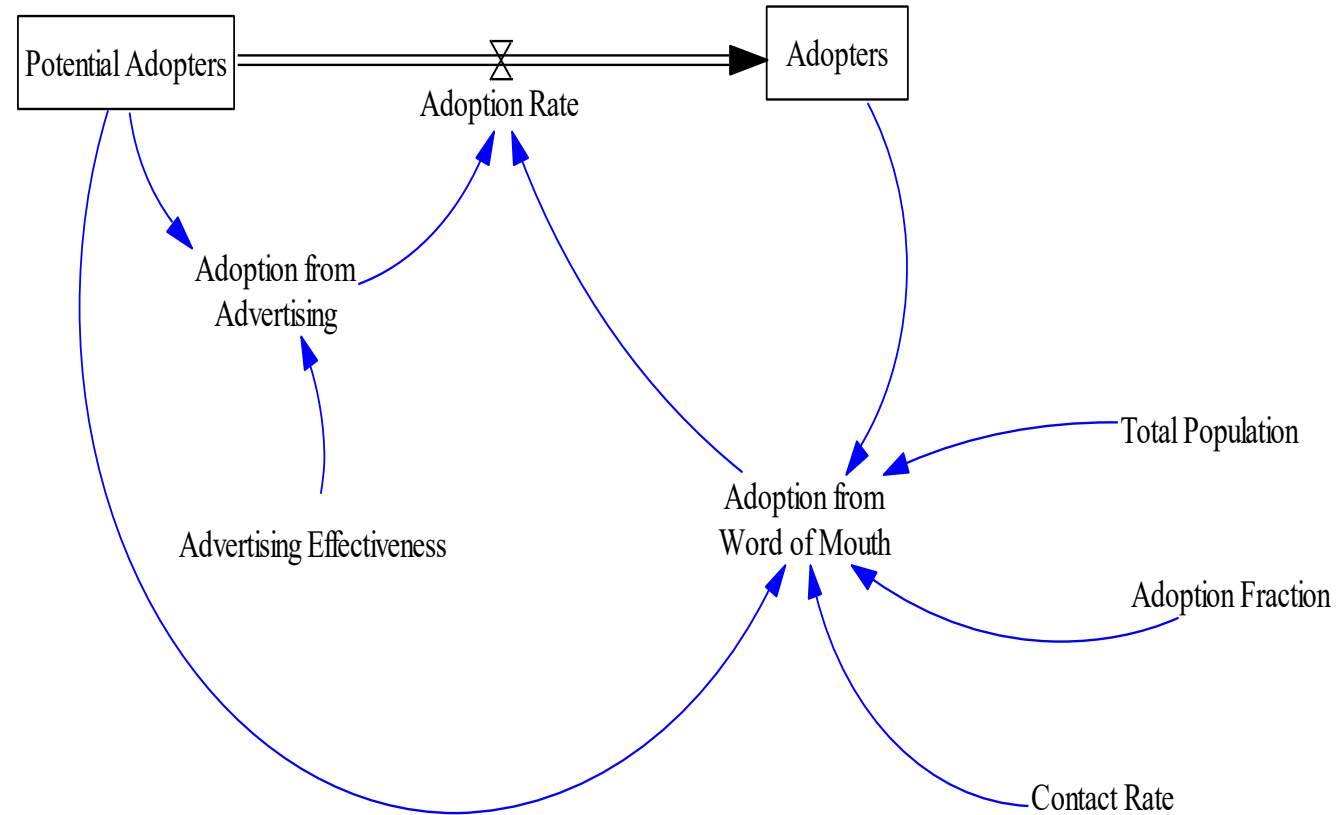
BassVensim

1. ENTITIES & WHAT GOES WHERE?

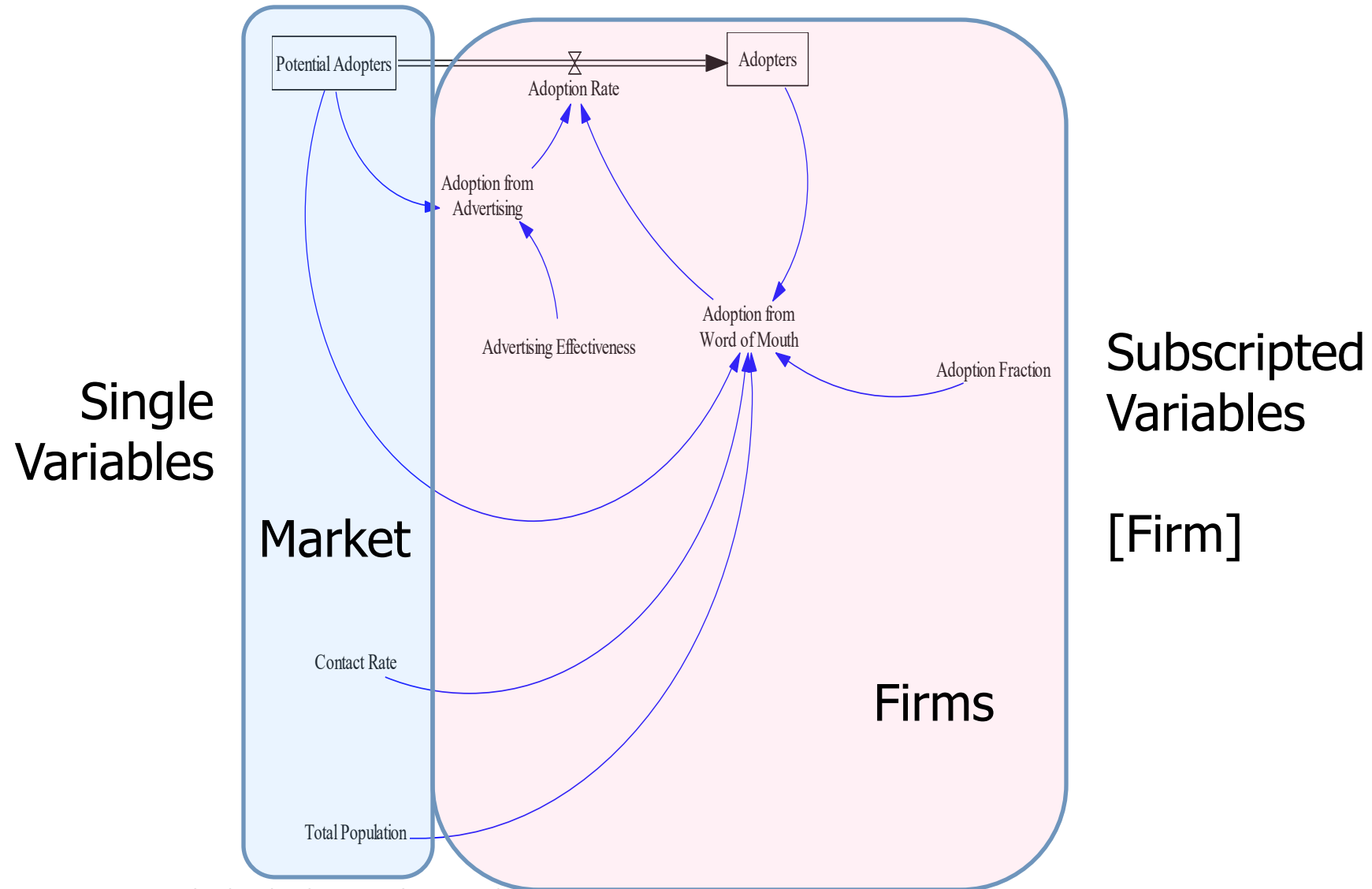
Principles

- **Everything in an **Entity type** shares a common level of detail**
- **Variables belong in the Entity type with the required level of detail. Implication:**
 - People are entities
 - Companies are entities
 - Customer relationships [People x Company] are entities
- **This is *not* how SD sector diagrams are typically drawn**
- **Global parameters can go in the Model (or another singleton)**

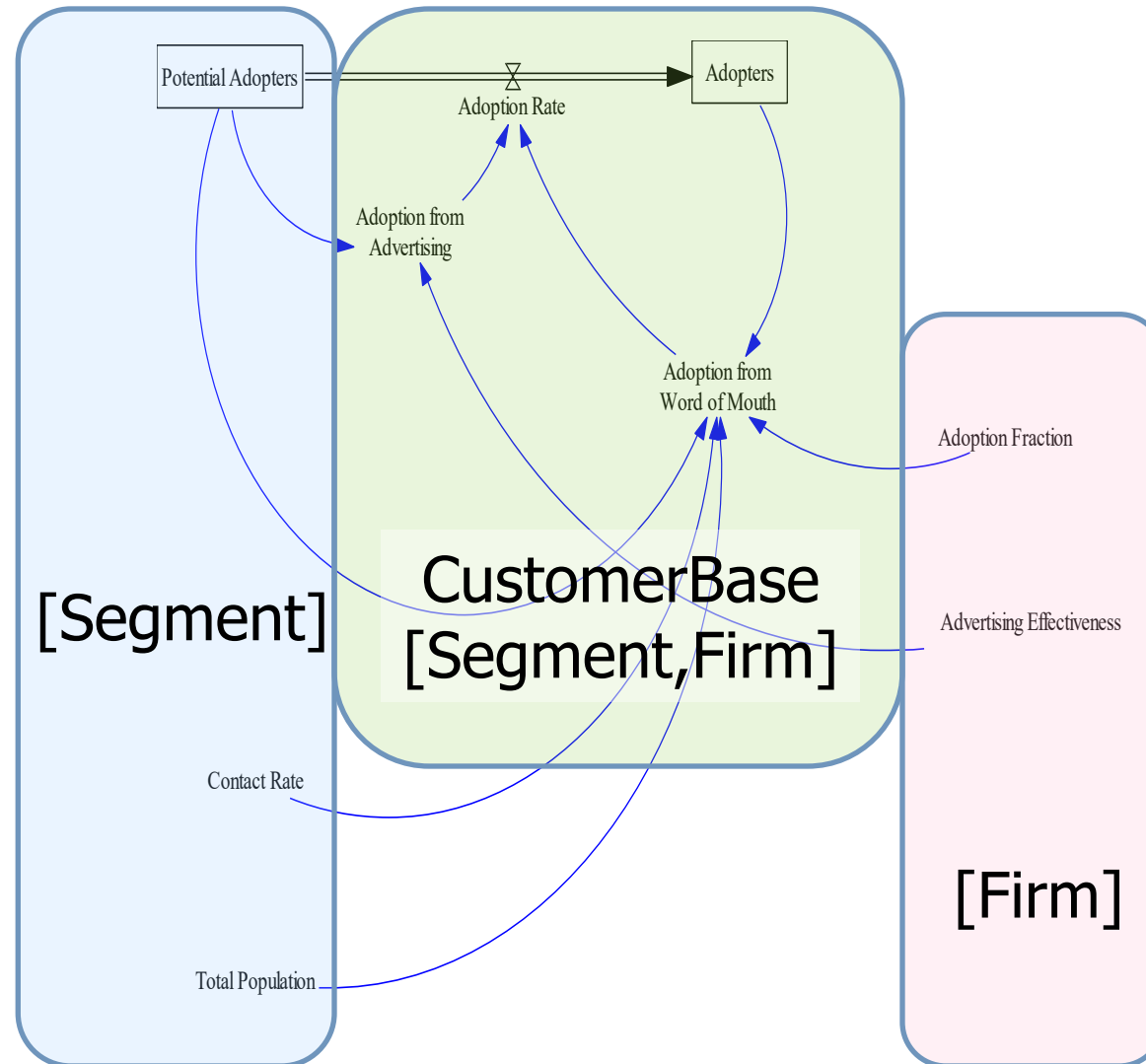
1. Classic Bass Model



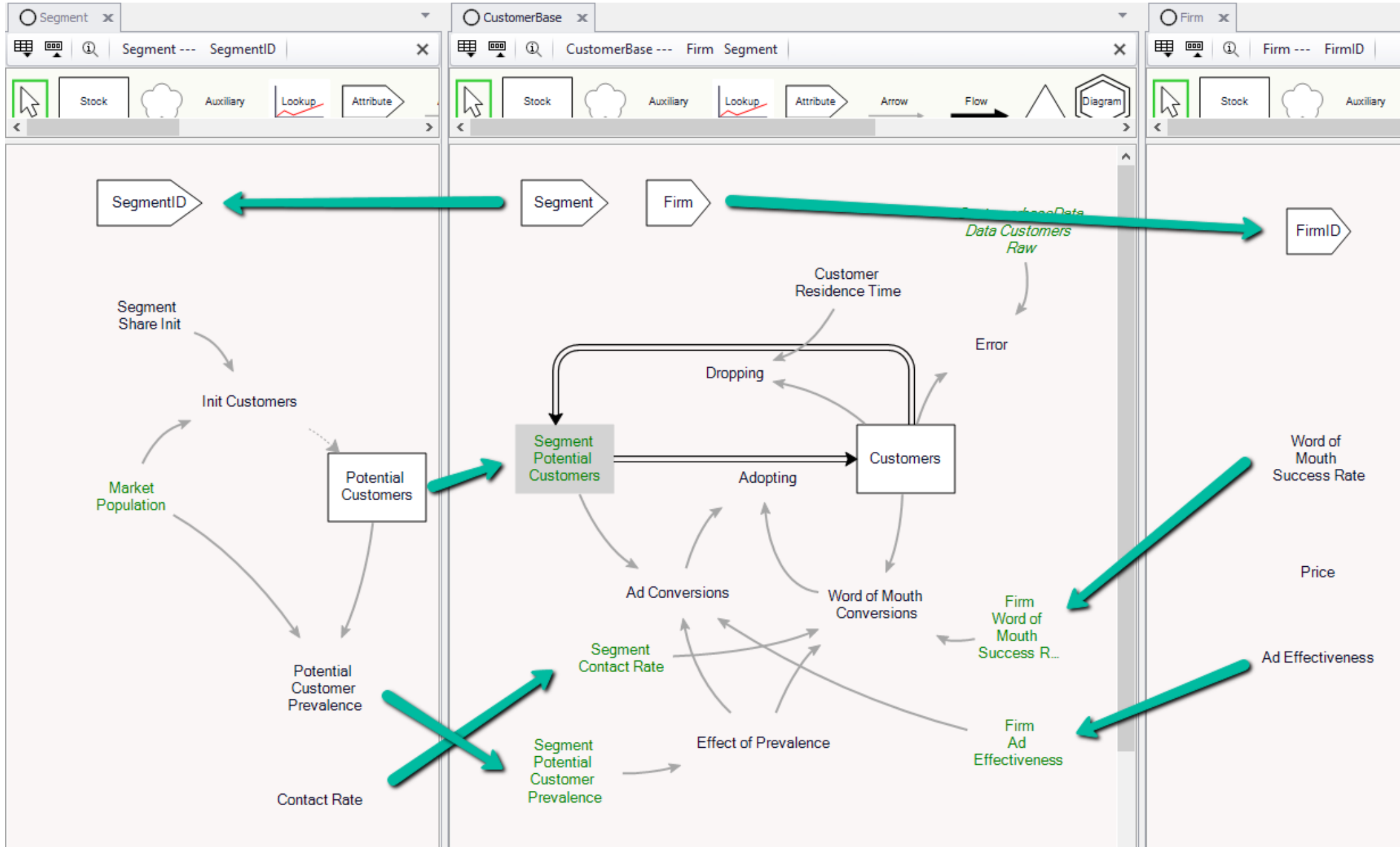
2. ... with multiple firms



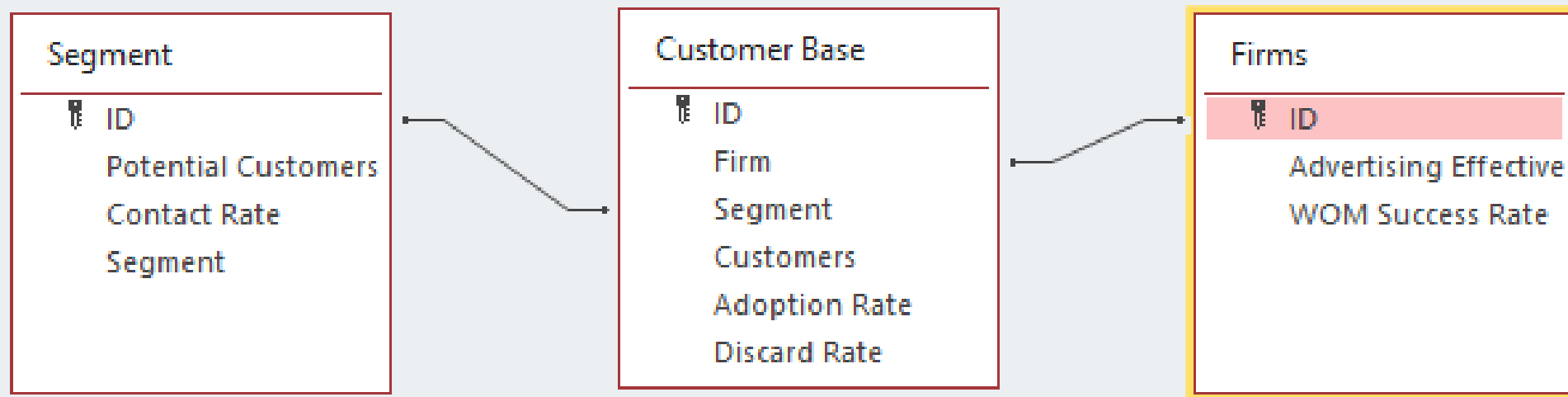
3. ... multiple segments & firms



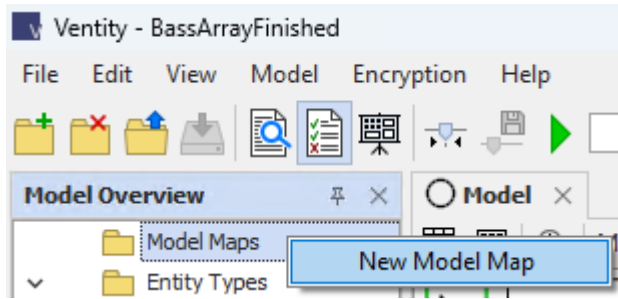
Implementation



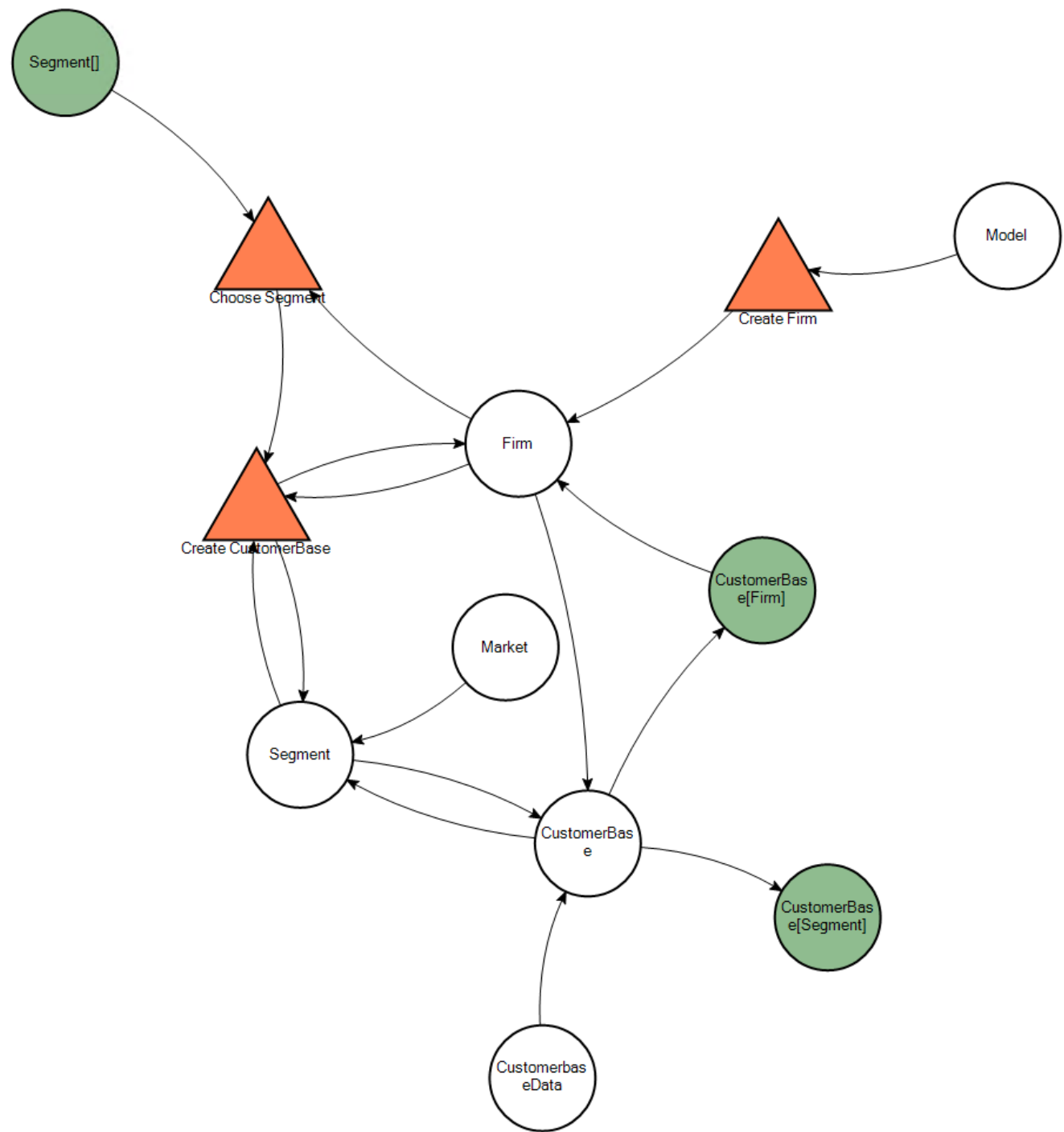
Analogy: Relational Database Tables

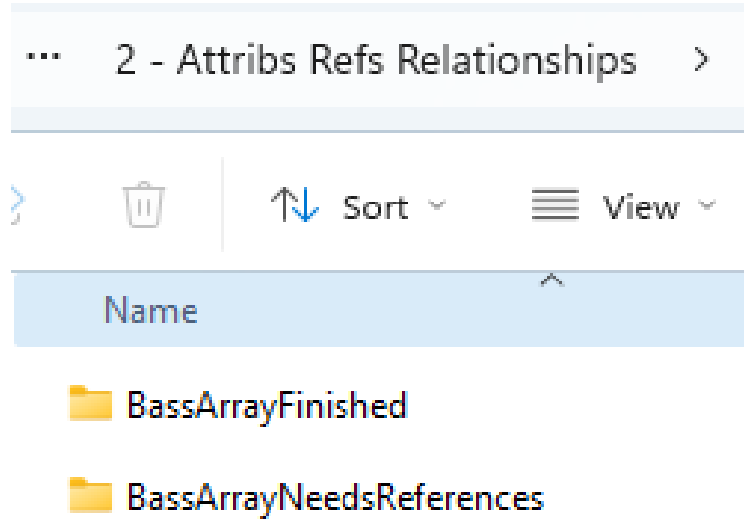


Lost? Make a Map



Right-click Model Maps



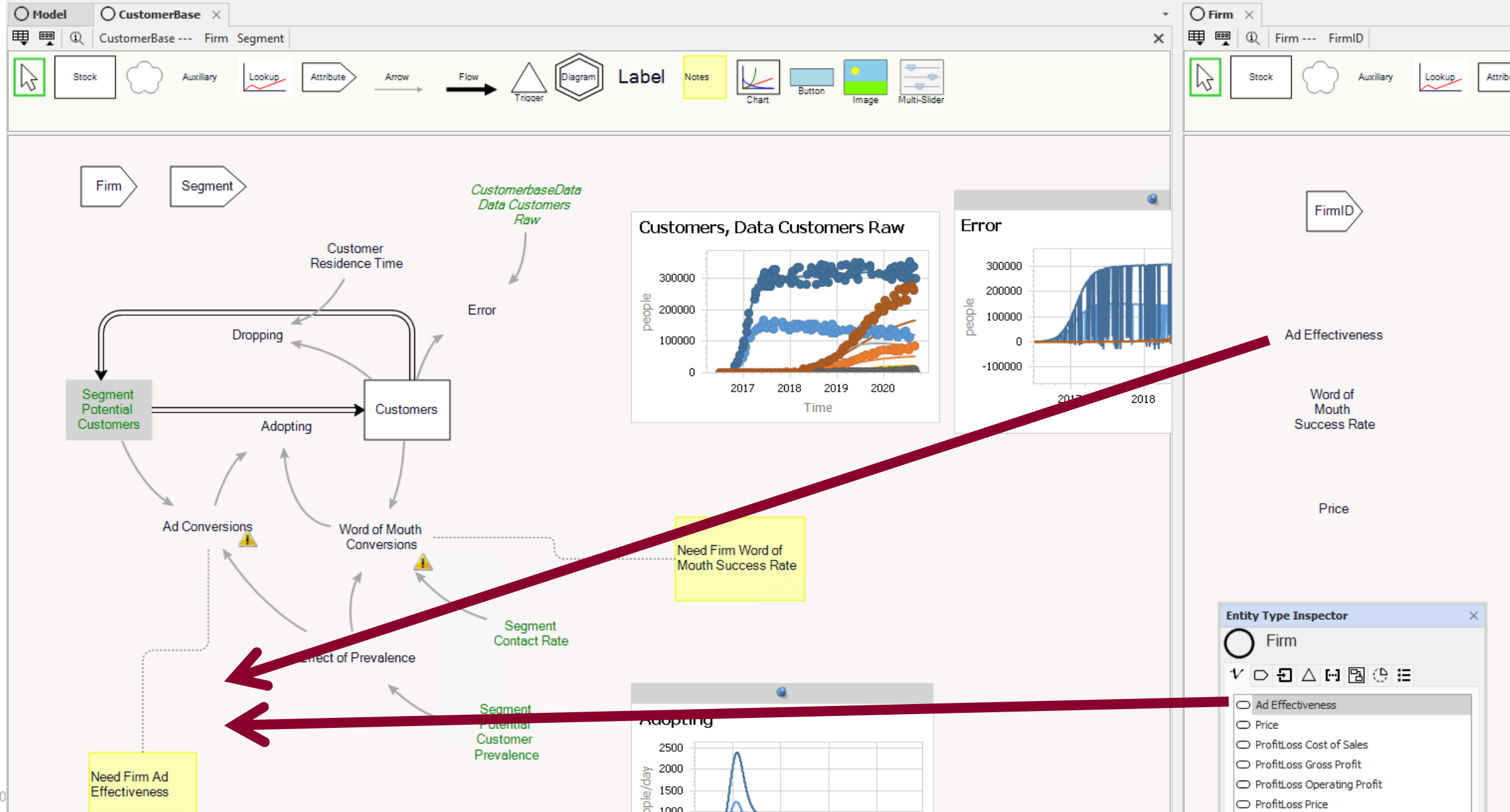


2. ATTRIBUTES, REFERENCES & RELATIONSHIPS

Adding References

- **The starting point model is missing a few connections**
- **Three options to create a reference:**
 - Drag from one diagram to another
 - Drag from an inspector to a diagram
 - Name the variable, then right-click in the equation
- **Define the reference**

Dragging



- Right-click the underlined variable and choose "Draw Arrow..."
- Only works if there's an existing Firm reference to use

The screenshot shows a software interface with a diagram at the top and a window titled "Auxiliary - CustomerBase.Word of Mouth Conversions" at the bottom. In the diagram, a node labeled "Word of Mouth Conversions" has a yellow warning triangle and a dashed line pointing to a yellow box labeled "Need Firm Word of Mouth Success Rate". Below this, the text "Segment Contact Rate" is written in green. The auxiliary window contains the following fields:

- Name: Word of Mouth Conversions
- Owner: CustomerBase
- Units: people/day
- ☐ Constant
- ☐ Enable causes glyph on node
- Equation: $\text{customers} * \text{segment.contact rate} * \text{Firm.Word of Mouth Success Rate} * \text{Effect of Prevalence}$
- Description: (empty field)

A right-click context menu is open over the underlined variable "Firm.Word of Mouth Success Rate" in the equation. The menu options are:

- Draw Arrow from 'Firm.Word of Mouth Success Rate' (highlighted with a red arrow)
- Edit Auxiliary
- Show In Diagram
- Plot Variable
- Bar Chart Variable
- Plot Uses
- View Data
- Uses Tree Diagram
- Causes-Uses Tree Diagram

Ventity Advanced > 3 - Data >

Name ^

 BassArrayFinishedStep 2

 BassArrayStart 0

3. DATA

Data

- **There are 2 kinds of “data”:**
 1. Entity Initialization Data, used to set up the model entities (similar to Vensim .cin files)
 2. Time Series Data, used for comparison or driving model variables

1. Entity Initialization Data

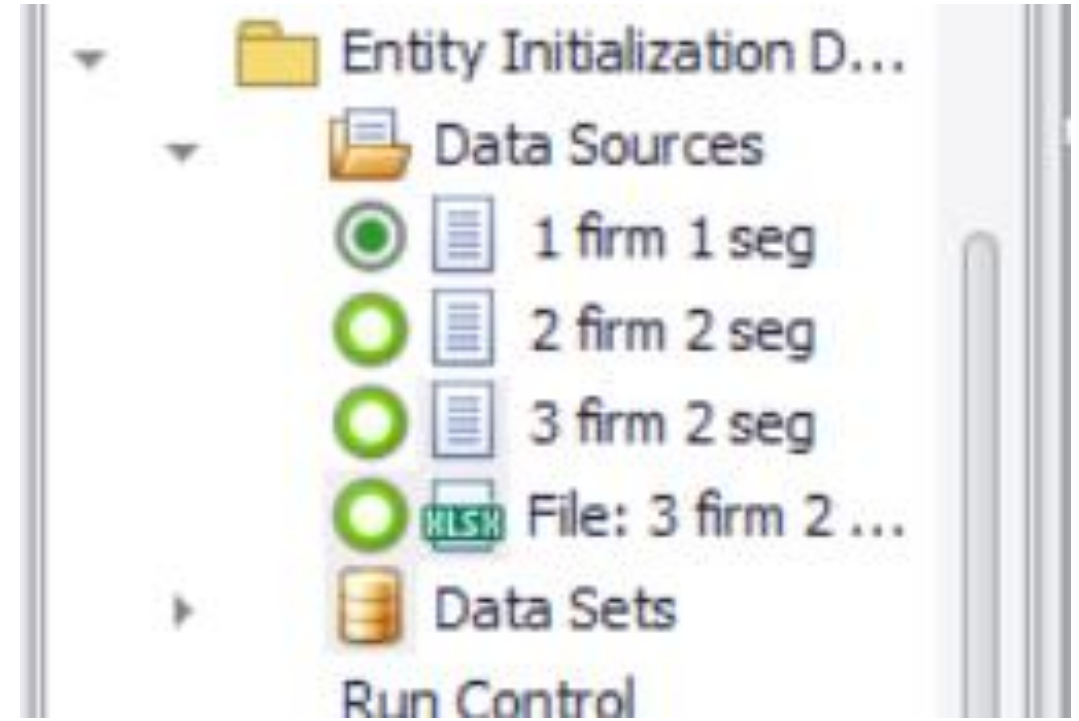
CustomerBase						Firm
	☐	Time	CalendarTime	FirmID	Success Rate	
▶ 1	☒	0		FirmA	0.009	
2	☒	0		FirmB	0.011	
3	☐		07/21/2014	NewFirm	0.015	
*						

CustomerBase				Firm		
	☐	Time	CalendarTime	Firm	Segment	Customers
▶ 1	☒	0		FirmA	Segment1	
2	☒	0		FirmB	Segment1	
3	☒	0		FirmA	Segment2	
4	☒	0				
5	☐					
*	☐					

CustomerBase		Firm		Market	Model	Segment
	☒	Time	CalendarTime	SegmentID	Potential Customers	Segment Share Init
▶ 1	☒	0		Segment1		0.25
2	☒	0		Segment2		0.75
*	☐					

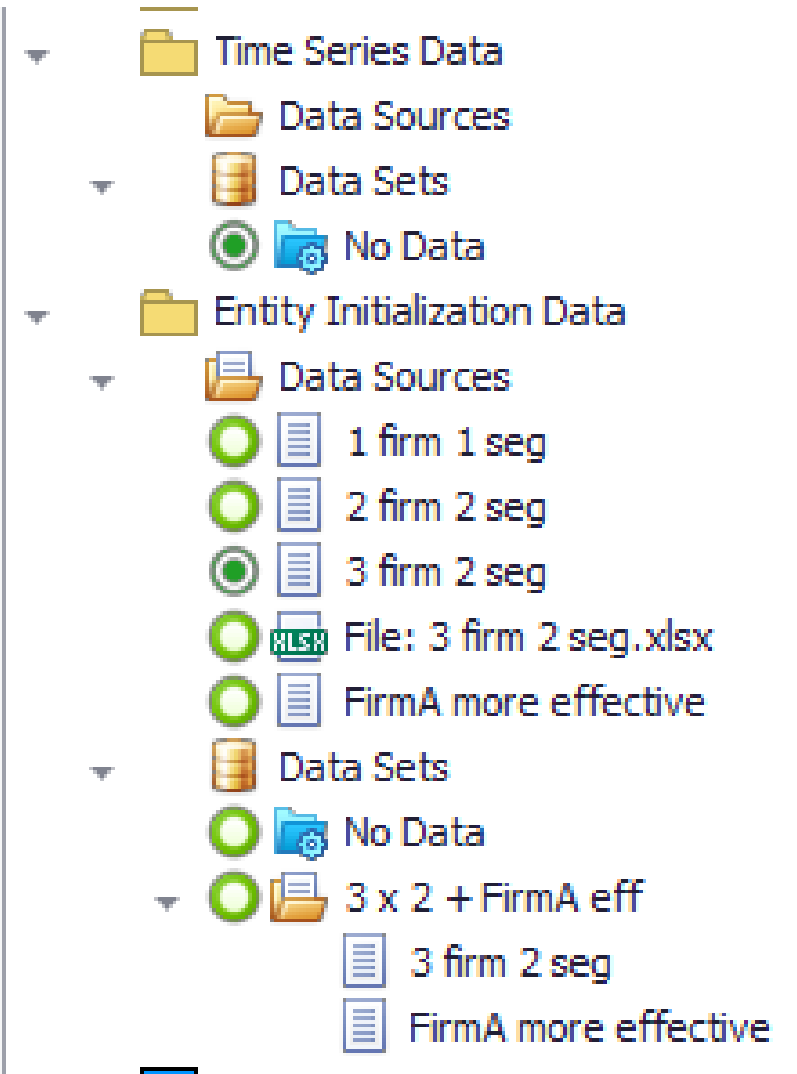
1a. Varying the data selection

- **Sources and Sets**
- **Run Control and data**
- **On-the-fly data selection**
- **Entity picking**



1b. Sources & Sets

- A “Source” is a single file
- A “Set” loads multiple Sources
- As in Vensim, order matters: the last set loaded wins in the event of a repeated element



1c. The Run Control

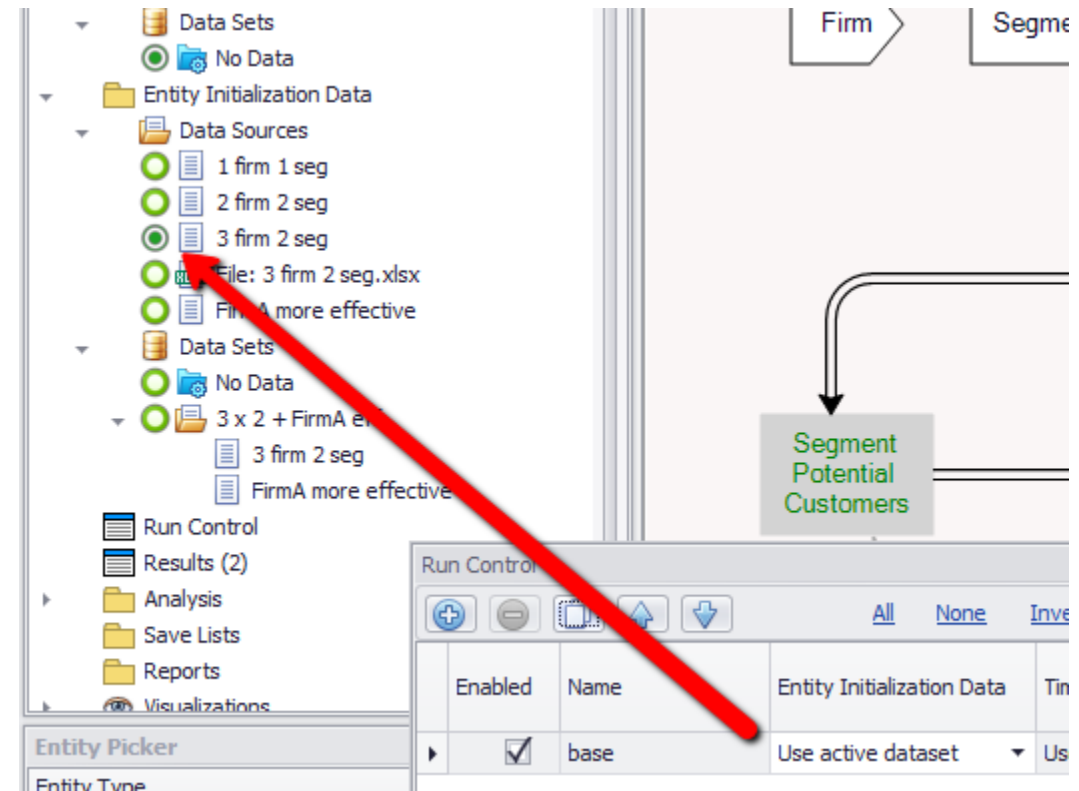
- **Run Control settings determine which data sources or sets to use**

The screenshot displays the Ventana software interface. On the left, a tree view shows the project structure, including 'Data Sets', 'Entity Initialization Data', 'Data Sources', and 'Run Control'. A red arrow points to the 'Run Control' item in the tree. On the right, a diagram shows a data flow from 'Firm' and 'Segment' to a box labeled 'Segment Potential Customers'. Below the tree view, the 'Entity Picker' shows 'CustomerBase' selected. The 'Run Control' dialog box is open, showing a table with columns: 'Enabled', 'Name', 'Entity Initialization Data', and 'Time'. The 'better FirmA' row is selected, and its 'Entity Initialization Data' is set to '3 x 2 + FirmA eff'. A red arrow points to this value in the table.

Enabled	Name	Entity Initialization Data	Time
☒	base	Use active dataset	Us
☒	better FirmA	3 x 2 + FirmA eff	Us

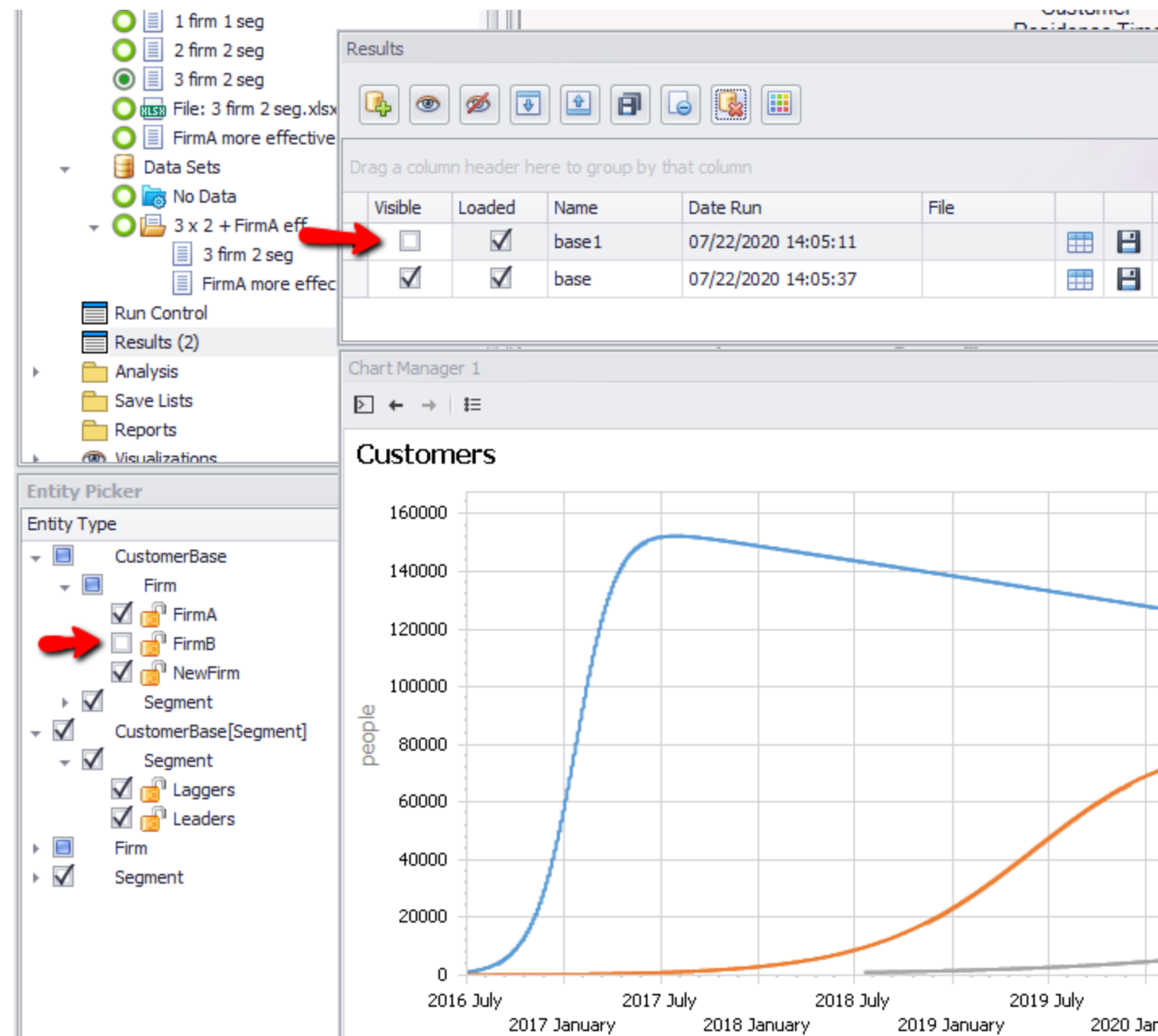
1c. On-the-fly selection

- If “use active dataset” is selected in the Run Control, the radio button in the Entity Initialization Data section controls the active data



1d. Selecting data visibility

- Initialization data determines which entities exist
- The Entity Picker selects which entities are visible
- The Results pane selects which runs are visible



2. Time Series Data

- **Everything about Sources, Sets and selection applies**
- **Formatting the data for import**
- **Mapping**
- **Using data**

2a. Formatting Data

- Easiest to use the Help as a cookbook

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- Examining Results
- The Ventity Workspace
- Further Information

Navigation: Defining Entity Types > Data Entities >

Data Sources

Excel files

A data source is a Microsoft® Excel spreadsheet or workbook containing data associated with particular times. Typically this means time figures over a 6 year period), but it can also mean a single data point (the population in September, 2012). Data files can be stored anywhere in any subfolder of the model folder.

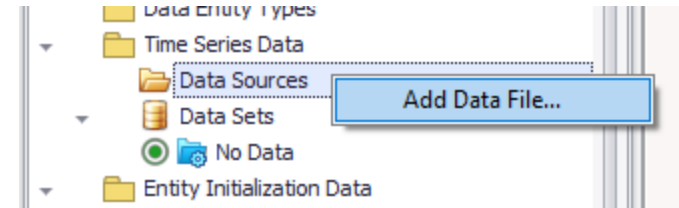
A single worksheet or tab will generally contain information for many entities, but all the entities on a single worksheet or tab must be of the same type. If you have more than one sheet for an entity type (say, Platypus), the sheets should be named Platypus, PI, etc. The text after the underscore does not have to be A, B, C; it can be whatever you like. The requirement is that each sheet name begins with the name of the entity type and the further text to make the name unique.

The worksheet may be organized in any one of four common layouts. Ventity automatically detects which one is being used, based on keywords as follows. The examples shown are for variables Weight and Age of entity type Platypus having key attribute PlatypusID.

Layout	Description	Requirements	Example																														
Tidy	Each row specifies an entity and time; each column, a variable	First row contains keyword "DateTime" as well as names of variables and key attributes	<table> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>PlatypusID</td> <td>DateTime</td> <td>Weight</td> <td>Age</td> <td></td> </tr> <tr> <td>2</td> <td>Albert</td> <td>0</td> <td>30</td> <td>14</td> <td></td> </tr> <tr> <td>3</td> <td>Albert</td> <td>1</td> <td>35</td> <td>15</td> <td></td> </tr> <tr> <td>4</td> <td>Beatrice</td> <td>0</td> <td>28</td> <td>12</td> <td></td> </tr> </tbody> </table>		A	B	C	D	E	1	PlatypusID	DateTime	Weight	Age		2	Albert	0	30	14		3	Albert	1	35	15		4	Beatrice	0	28	12	
	A	B	C	D	E																												
1	PlatypusID	DateTime	Weight	Age																													
2	Albert	0	30	14																													
3	Albert	1	35	15																													
4	Beatrice	0	28	12																													

2b. Creating a Mapping

- **Add the file SyntheticData.xlsx**
- **Detect Source Entity Types**
- **Create Data Entity Types**



Time Series Data Mapping - File: SyntheticData.xlsx

Mapping Name: SyntheticData.xlsx
 The Series Data Description: syntheticdatamapping
 File: SyntheticData.xlsx

Detect Source Entity Types **Create Data Entity Types**

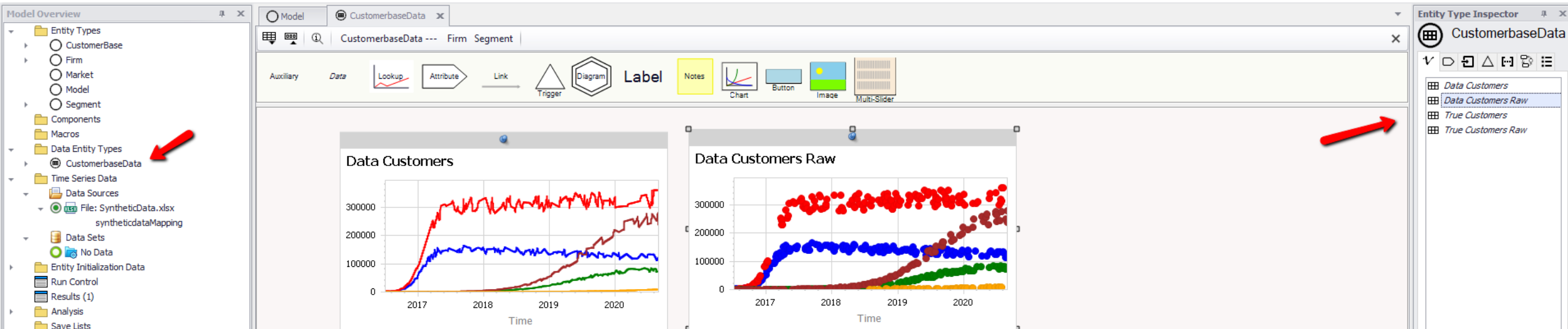
Source Entity Type: **customerbase** Data Entity Type: Select Data Entity Type **CustomerbaseData**

customerbase

Source Name	Source Type	Interpolation Type	Aggregation Type	Source Units	Source Description	Source Measurement Type	Data Name	Data Type	Data Key
Firm	Key						Firm		
Segment	Key						Segment		
True Custo...	Variable	Straight					True Custo...		
Data Custo...	Variable	Straight					Data Custo...		

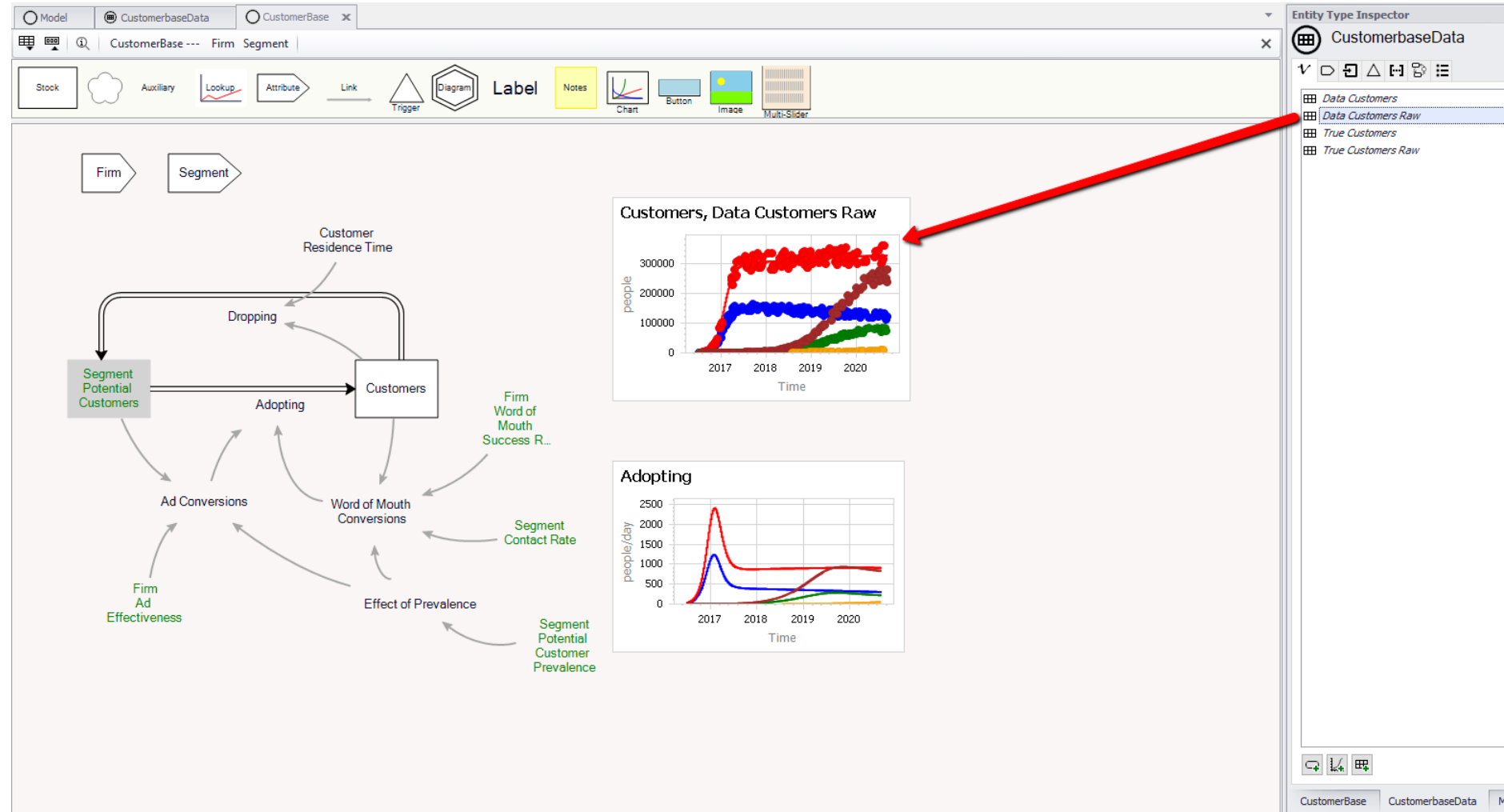
2c. Viewing Data

- Now you have a data entity containing the data variables.
- There's no diagram (though you could drag variables from the inspector to create one)
- You can drop charts onto the diagram for viewing



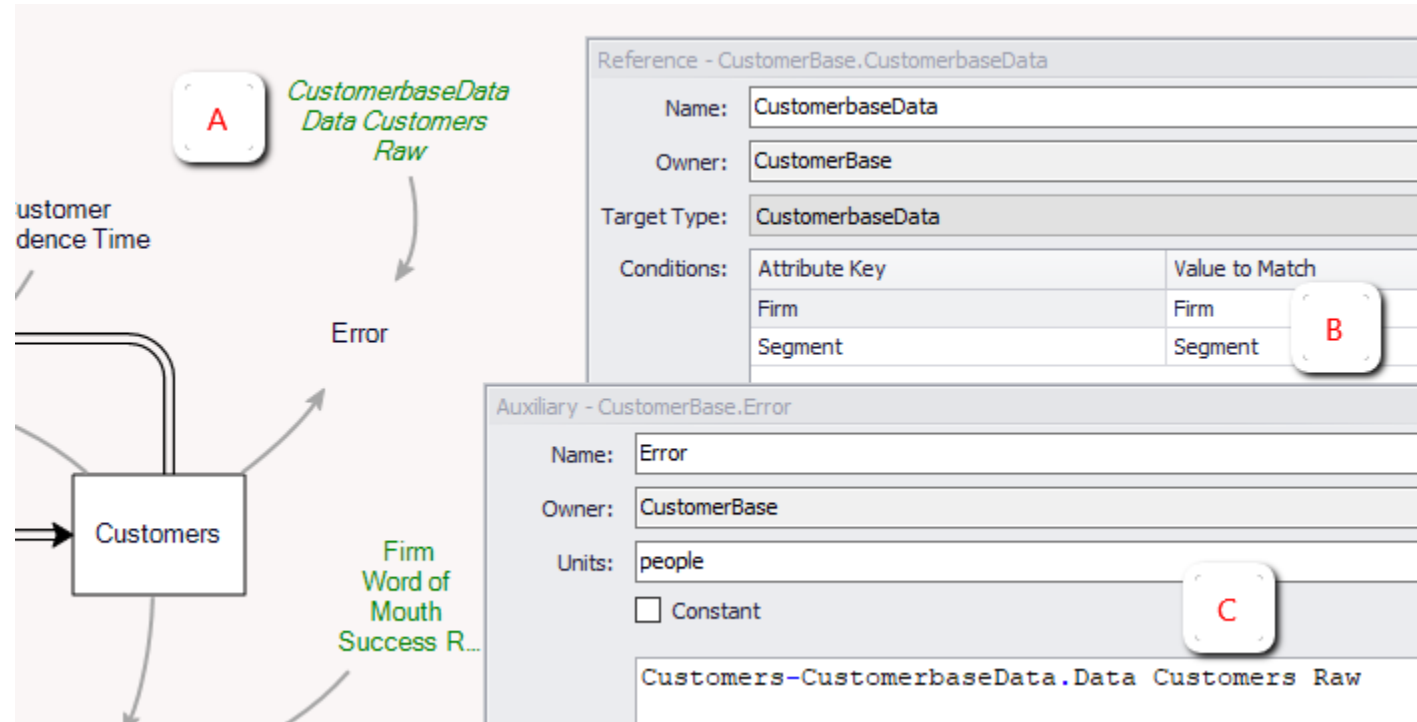
2d. Creating a Comparison

- Drag the data from the inspector onto a chart with the corresponding model variable



2e. Using the Data

- A. Drag the data variable onto the CustomerBase diagram**
- B. Right-click and edit the Reference to match Firm and Segment**
- C. Add an auxiliary to compute the Error as the difference between simulated Customers and the data.**



Ventity Advanced > 4 - Actions > ▼

Name ^

 BassArrayFinishedStep 4 - start

 BassArrayFinishedStep 5

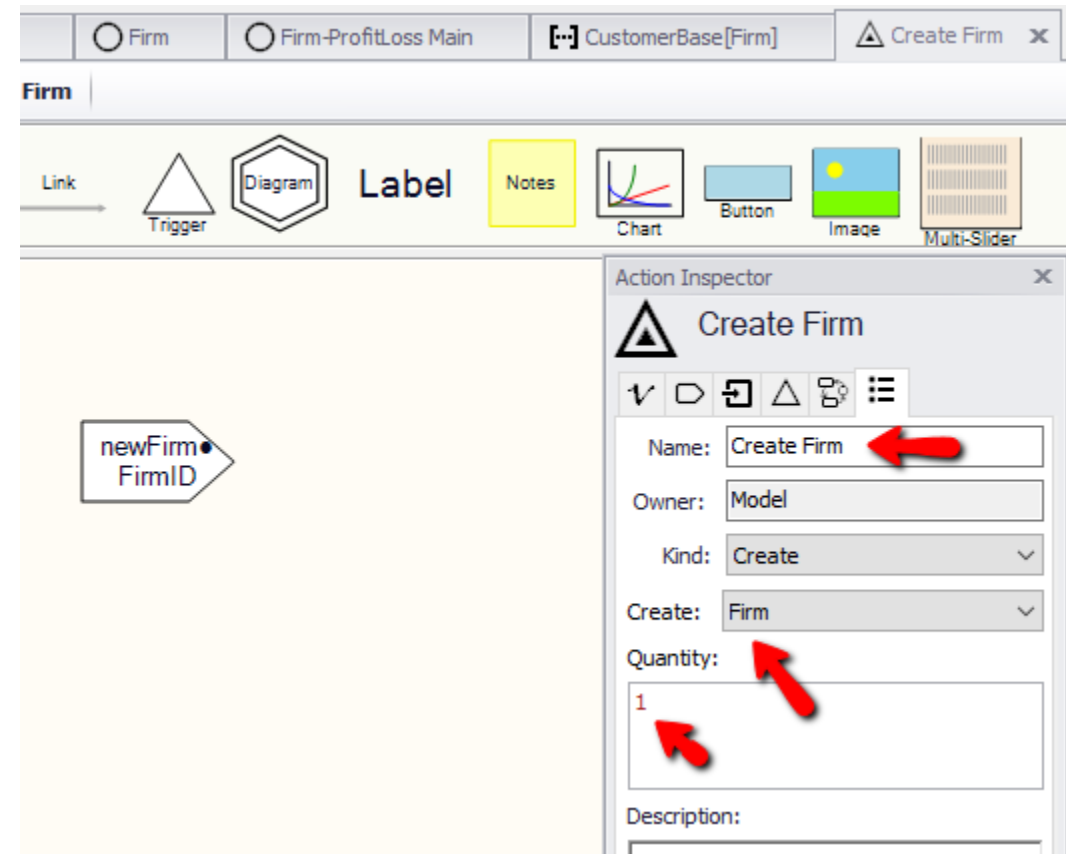
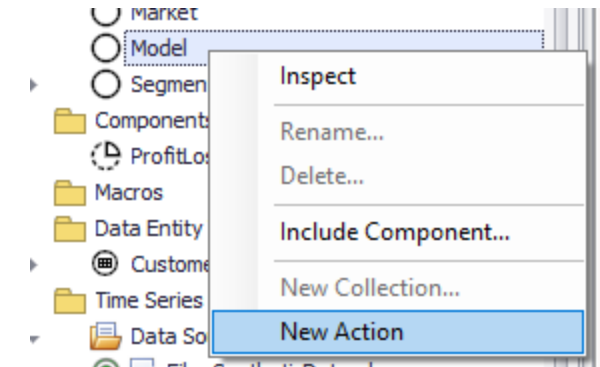
4. ACTIONS

5. Add Firm Launch

- **Where?**
 - The Model is convenient
 - The Firm[] might be an alternative
 - Putting it in the Firm is usually undesirable, unless Firms are spawning more Firms (e.g., spinoffs)
- **Parts needed**
 - An Action that creates a Firm
 - A Trigger that fires the action

5a. The Action

- **Right-click the Model to make a New Action**
- **Edit the result to set the name, type and quantity**



5b. The Trigger

- A. Drag a Trigger onto the Model diagram
- B. Create variables to flag the event of a launch (a frequency of .001/day works since there are ~1500 days); you may want to give the base and policy runs the same random seed in the Run Control
- C. Set the Trigger condition to the flag value
- D. Set the Action to point to the action created in previous step

The screenshot displays the Ventana Systems software interface. At the top, the 'Model' tab is active, showing a diagram with three hexagonal nodes: 'Firm Main', 'CustomerBase Main', and 'Segment Main'. A 'Trigger' icon is visible in the top toolbar. The 'Market Assumptions' table is shown on the right, with columns for 'segment', 'Min', 'Contact Rate: (1/day)', 'Max', and 'Units'. The table lists 'Leaders' and 'Laggers' segments. Below the table, the 'Auxiliary - Model.Firm Enters' dialog is open, showing the 'Name' as 'Firm Enters', 'Owner' as 'Model', and 'Units' as 'dmnl'. The 'Trigger If' condition is set to 'Firm Enters > 0'. The 'Action to Invoke' is set to 'Create Firm'. The 'Trigger - Model.Create Firm' dialog is also open, showing the 'Name' as 'Create Firm', 'Owner' as 'Model', 'Seq. No.' as '1', and 'When' as 'Period Start'. The 'Trigger If' condition is set to 'Firm Enters > 0'. The 'Action to Invoke' is set to 'Create Firm'.

Market Assumptions

segment	Min	Contact Rate: (1/day)	Max	Units
Leaders	1		20	6
Laggers	1		20	2

Auxiliary - Model.Firm Enters

Name: Firm Enters
 Owner: Model
 Units: dmnl
☐ Constant
 RandomBernoulli(Firm Entry Frequency*Time Step)

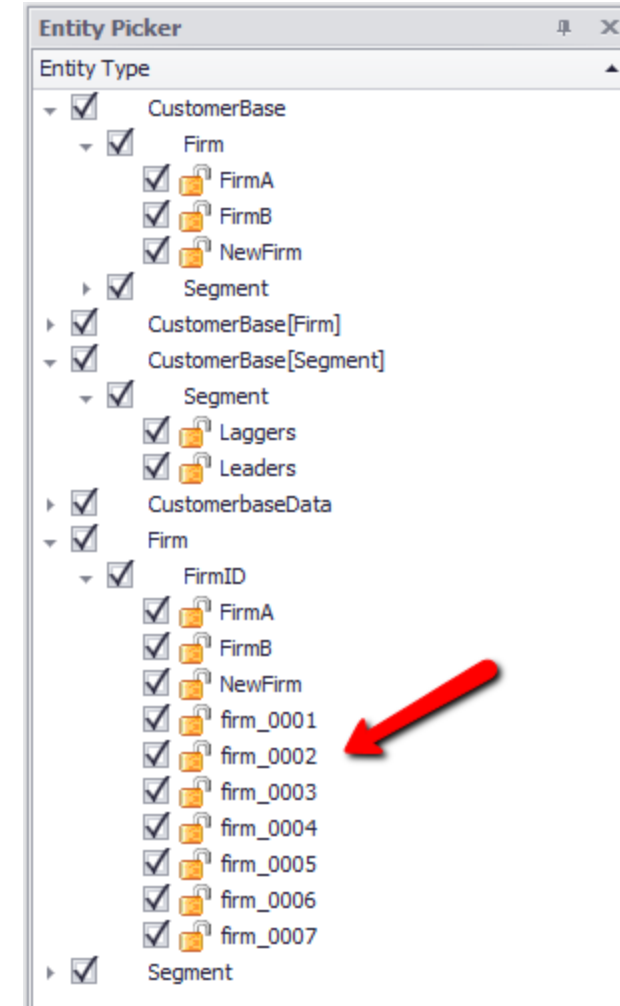
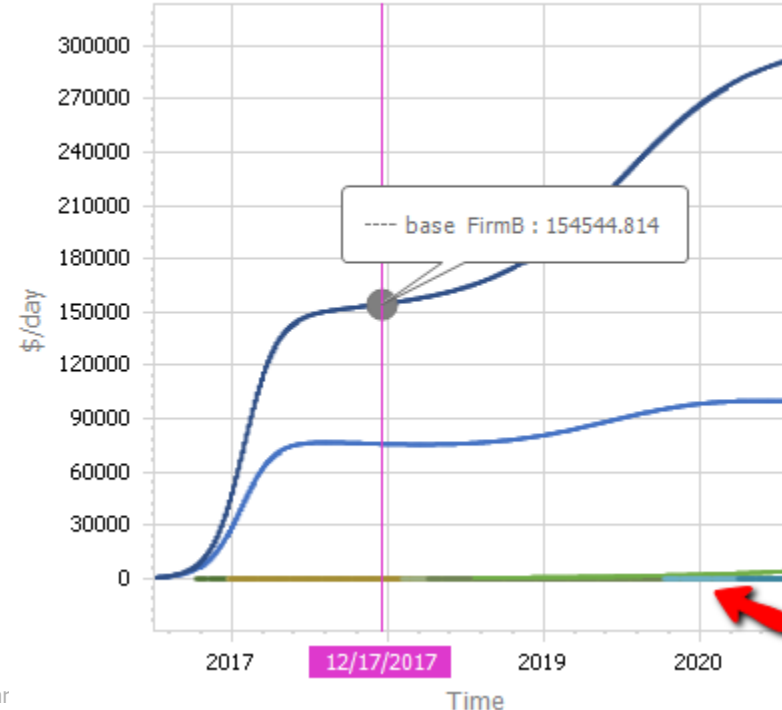
Trigger - Model.Create Firm

Name: Create Firm
 Owner: Model
 Seq. No.: 1
 When: Period Start
 Trigger If: Firm Enters > 0
 Action to Invoke: Create Firm

5c. Viewing Firms

- The new firms are hard to spot on charts, because they have no Customers
- They're easier to find in the Entity Picker or data tables

ProfitLoss Operating Profit



6. Why no customers? Firm Segment Entry

- **Newly-created firms aren't active in any market Segments, i.e. they have no CustomerBase entities associated with them.**
- **To fix this:**
 - A Firm can check the CustomerBase[Firm] subcollection to see whether it's active in any segments
 - If none, the Firm can run a Process List action to pick a Segment to enter.
 - The Firm messages the Segment to add a new CustomerBase entity with matching Firm and Segment attributes.

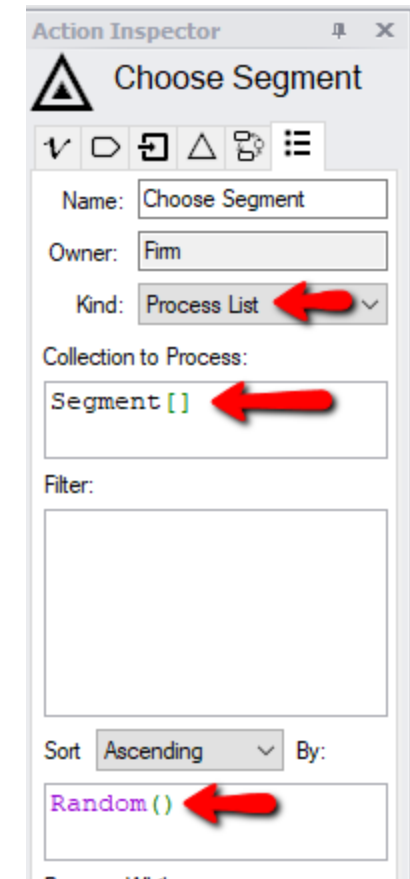
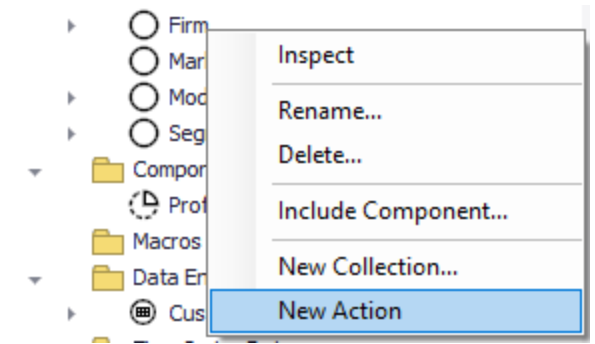
6a. The Firm entry trigger

The screenshot shows the Ventana software interface. At the top, there are tabs for 'Firm', 'Firm-ProfitLoss Main', and 'CustomerBase[Firm]'. Below the tabs is a toolbar with icons for 'Trigger', 'Diagram', 'Label', 'Notes', 'Chart', 'Button', 'Image', and 'Multi-Slider'. In the center, there is a diagram with a triangle and a red 'X' icon, labeled 'Choose Segment'. A green arrow points from the 'Collection Inspector' to the 'Choose Segment' diagram. The 'Collection Inspector' is a panel on the right side of the screen, titled 'Collection Inspector'. It shows the collection 'CustomerBase[Firm]' and a list of actions: 'Sum Customers' and 'Count'. The 'Count' action is selected. Below the 'Collection Inspector' is a dialog box titled 'Trigger - Firm.Choose Segment'. It has fields for 'Name' (Choose Segment), 'Owner' (Firm), 'Seq. No.' (1), and 'When' (Period Start). The 'Trigger If' section contains the condition 'CustomerBase by Firm.Count = 0'. The 'Action to Invoke' section is empty.

- Add a Trigger to the Firm
- Drag **CustomerBase[Firm].count** onto the diagram
- Set the trigger to fire when count=0
- Leave the action blank (come back and fill it in after we create the action)

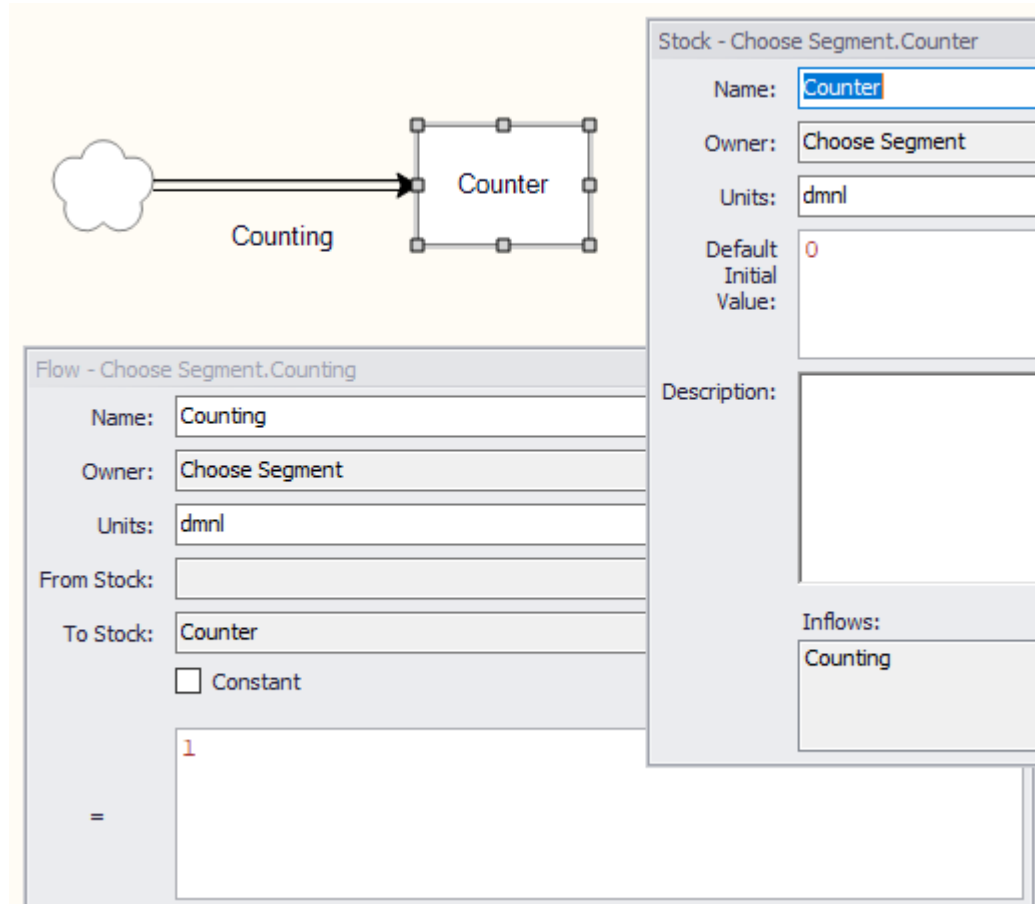
6b. The Process List action

- Create a new action in the Firm
- Set the Kind, Collection to Process and Sort



6c. Limiting entry to 1 segment

- Create a Counter stock and flow in the action
- Notice that, because an action is a discrete event, the stock and flow have the same units
- This stock exists only in the action, so it will count the number of iterations of the Process List loop



- Set the Process While field to Counter=0
- Create a trigger for Create CustomerBase (we'll fill it in later)

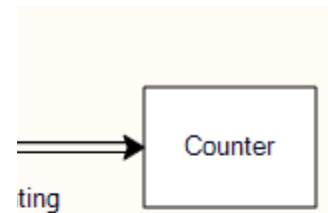
Filter:

Sort Ascending By:

Random()

Process While:

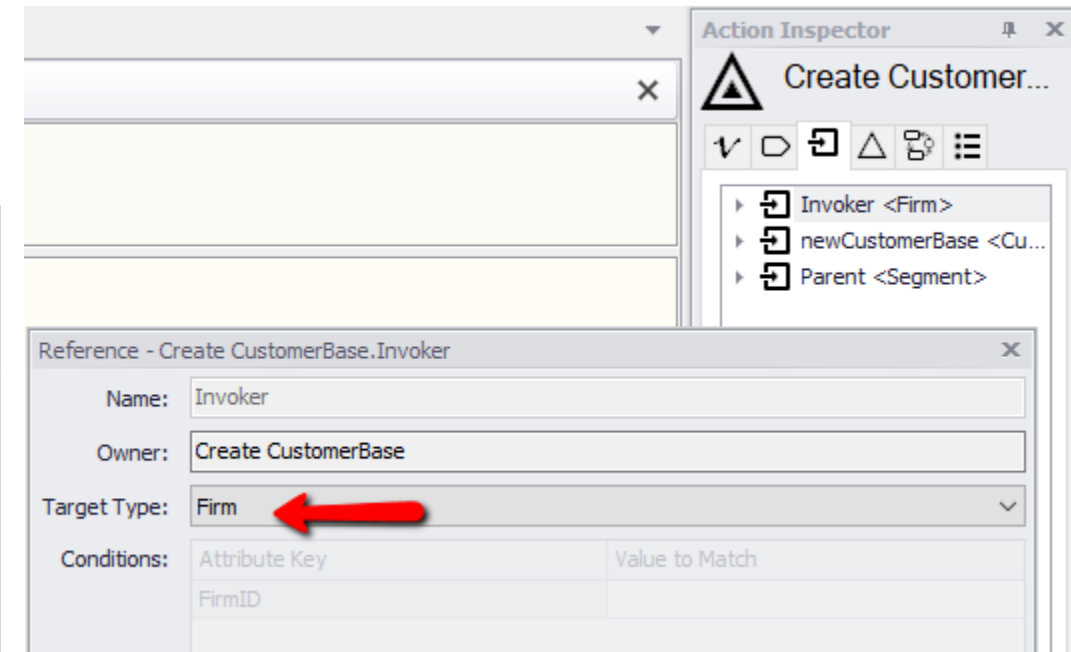
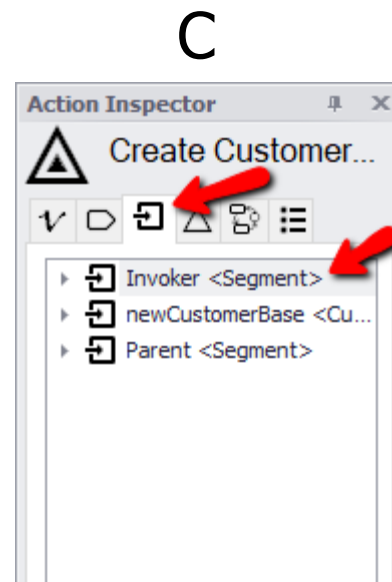
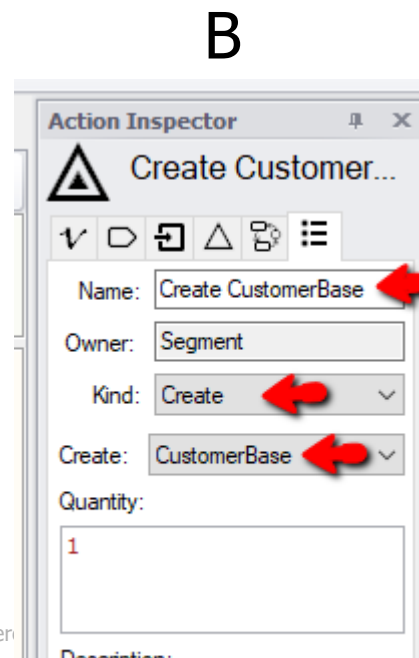
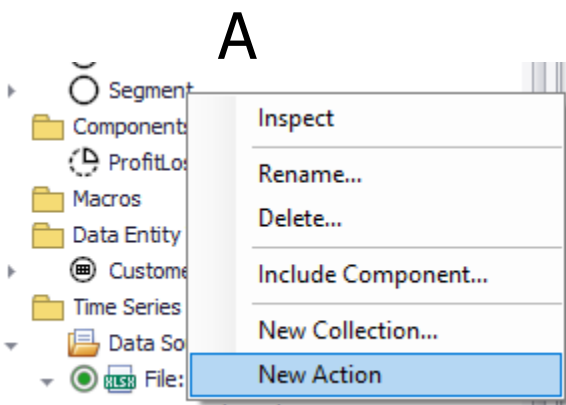
Counter=0



6d. Creating the CustomerBase

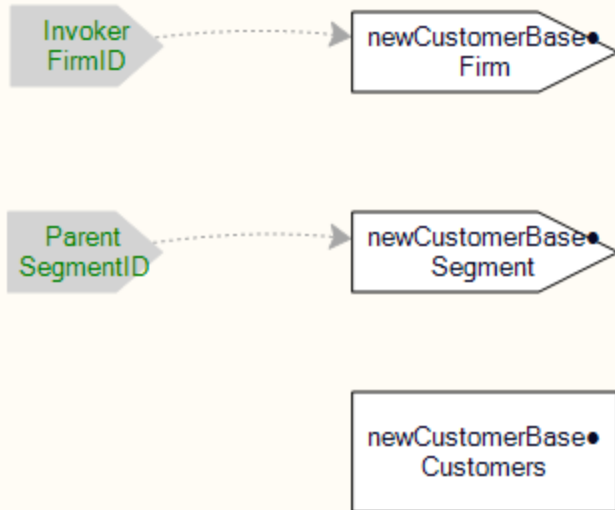
- A. Create a new action in the Segment**
- B. Name it, and set the Kind and Create type**
- C. Switch to the References tab and edit the Invoker**
- D. Change the type to Firm**

D



6e. Define the new CustomerBase's attributes

- You can drag the invoker and parent ids from the inspector, or type them and use the right-click-draw-arrow method to add them to the diagram



Attribute - Create CustomerBase.newCustomerBase • Firm

Name: newCustomerBase • Firm

Owner: Create CustomerBase

Refers to: Firm

☒ Key

New Value: Invoker.FirmID

Attribute - Create CustomerBase.newCustomerBase • Segment

Name: newCustomerBase • Segment

Owner: Create CustomerBase

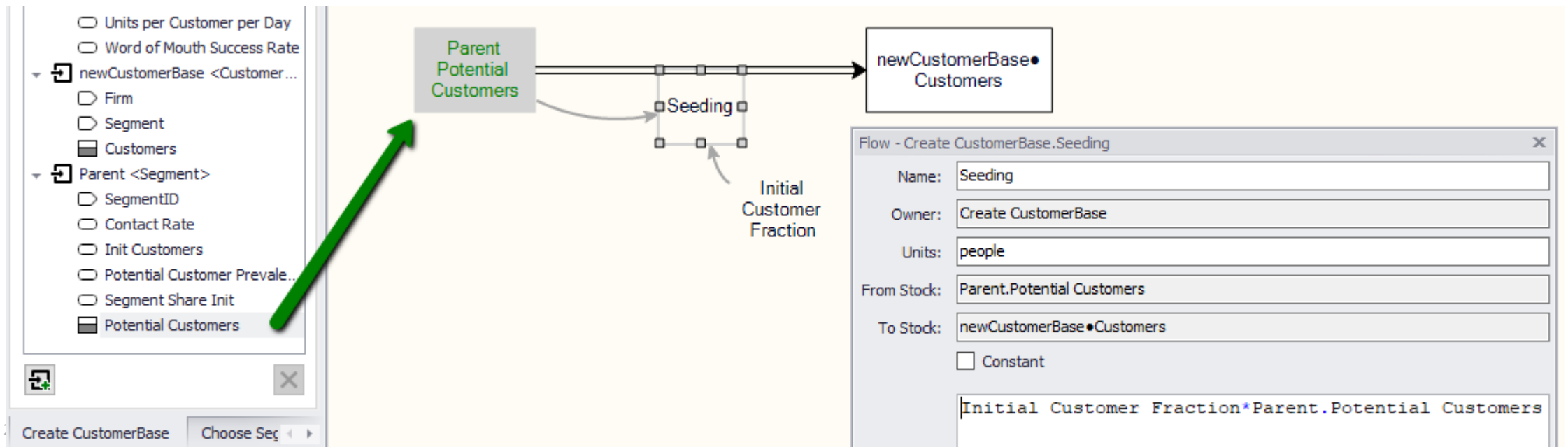
Refers to: Segment

☒ Key

New Value: Parent.SegmentID

6f. Define the initial Customers stock

- This is a little tricky – if we add a nonzero numerical value, we're creating new people
- If we use 0, there's no word of mouth for the new company
- Instead, we can seed the market with a small fraction of the Potential Customer stock
- We can do this by creating a cross-entity flow:



6g. Finishing up

- We're almost done – we just need to define the triggers we left empty
- It's easy to find them in the error list



CustomerBase
by Firm
Count

Trigger - Firm.Choose Segment

Name: Choose Segment

Owner: Firm

Seq. No.: 1

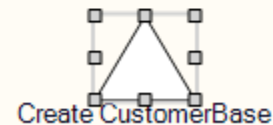
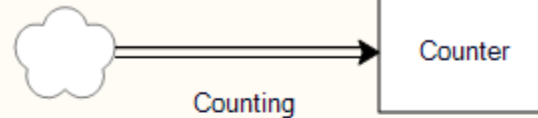
When: Period Start

Trigger If:

CustomerBase by Firm.Count = 0

Action to Invoke:

Choose Segment



Error List	
Source	Description
Trigger "Choose Segment"	Missing Action to invoke
Trigger "Create CustomerBase"	Missing Action to invoke

Trigger - Choose Segment.Create CustomerBase

Name: Create CustomerBase

Owner: Choose Segment

Seq. No.: 1

When: Never

Trigger If:

true

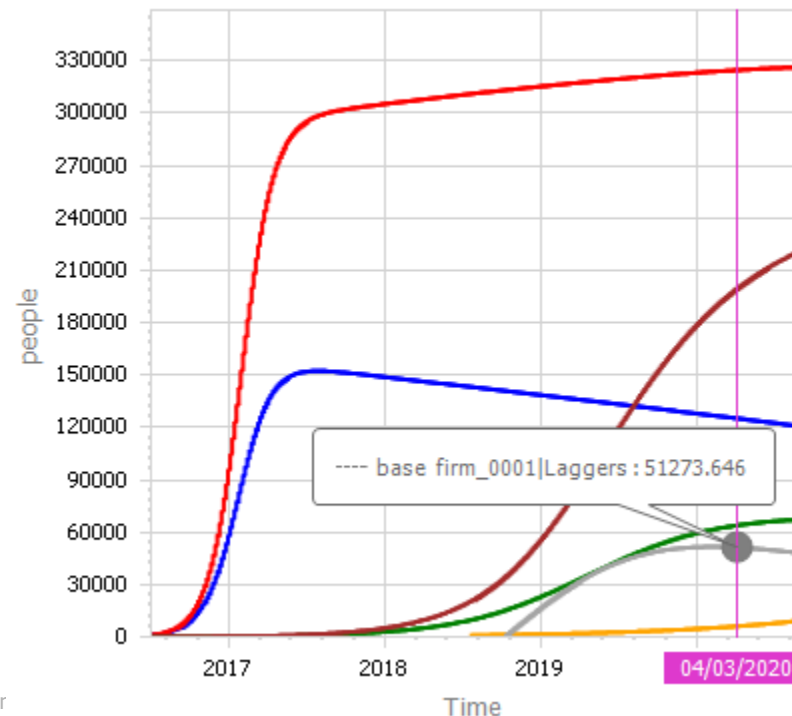
Action to Invoke:

refSegment.Create CustomerBase

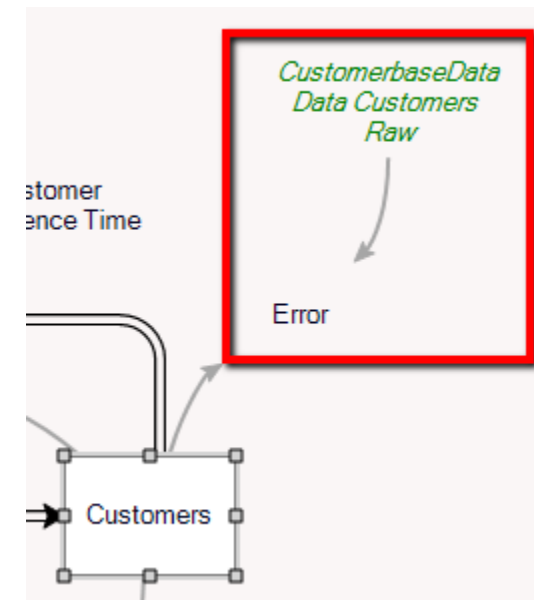
Done!

- **New firms now enter the market with customers and profits**
- **You'll see some warnings due to lack of data for new firms – ignore, or delete the computation**

Customers



Error List	
Source	Description
Runtime	[831] 10/10/2018 - Null reference customerbasedata in customerbase[firm_0001 Laggers] using "firm_0001 Laggers"
Runtime	[831] 10/10/2018 - Null reference customerbasedata in customerbase[firm_0001 Laggers] using "firm_0001 Laggers"



5. CONTROLS

4. Add Slider Controls & Charts

- **Where should we put them?**
 - The Model entity is often convenient for top-level controls
 - Detailed drill-down can live in other entities
- **Slider variables must be Constants**
- **A slider affects all runs, unless “Ignore First Run” = True**
 - This facilitates a nice treatment of base case vs. policy runs

4a. Adding a Slider

- Drag onto diagram
- Right-click to edit
- Choose the Bound Variable
- Edit settings as needed

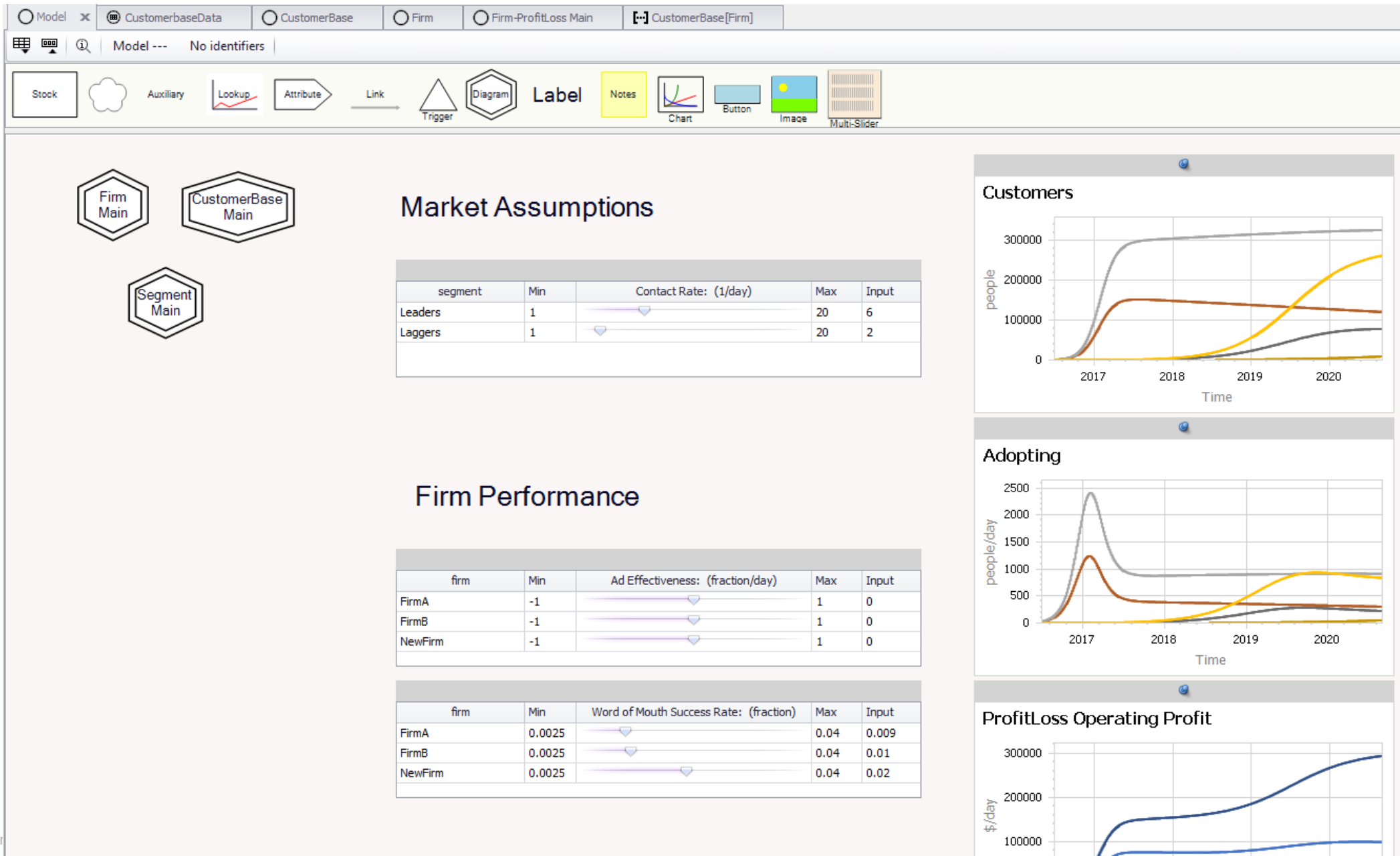
The screenshot shows the Ventana software interface. At the top is a toolbar with icons for Trigger, Diagram, Label, Notes, Chart, Button, Image, and Multi-Slider. Below the toolbar is a diagram area titled 'Market Assumptions'. In this area, there is a table with columns 'segment', 'Min', and 'Contact Rate: (1/day)'. The table has two rows: 'Leaders' and 'Laggers', both with a 'Min' value of 1. A red arrow points from the 'Multi-Slider' icon in the toolbar to the slider in the 'Contact Rate' column of the table. To the right of the table is a 'Misc' settings panel. The 'Bound Variable' dropdown menu is open, showing a list of variables. A red arrow points from the 'Bound Variable' dropdown to the 'Segment.Contact Rate' option in the list.

segment	Min	Contact Rate: (1/day)
Leaders	1	
Laggers	1	

Misc

Name	Segment.Contact Rate_C1
Bound Variable	Segment.Contact Rate
Entity Type	CustomerBase.Customer Residence Time
SliderCaption	CustomerBase.Customers
Precision	Firm.Ad Effectiveness
Auto Set Min/Max Values	Firm.Price
Minimum	Firm.Word of Mouth Success Rate
Maximum	Market.Population
	Segment.Contact Rate

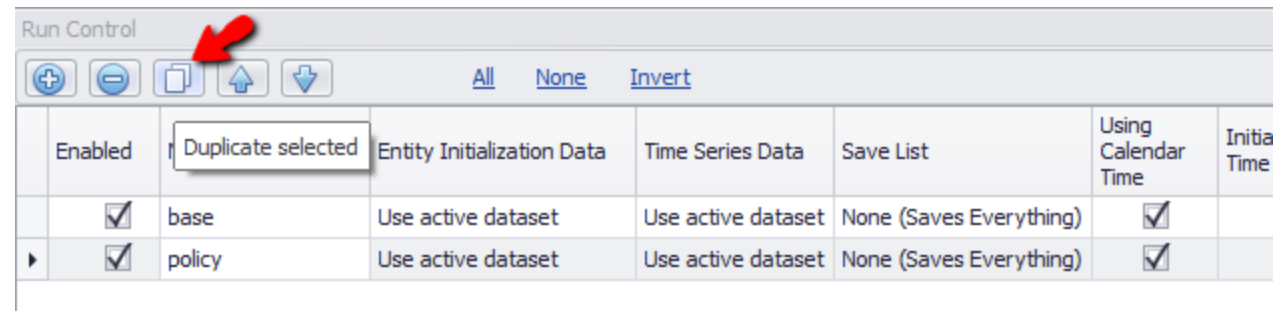
4b. A possible layout



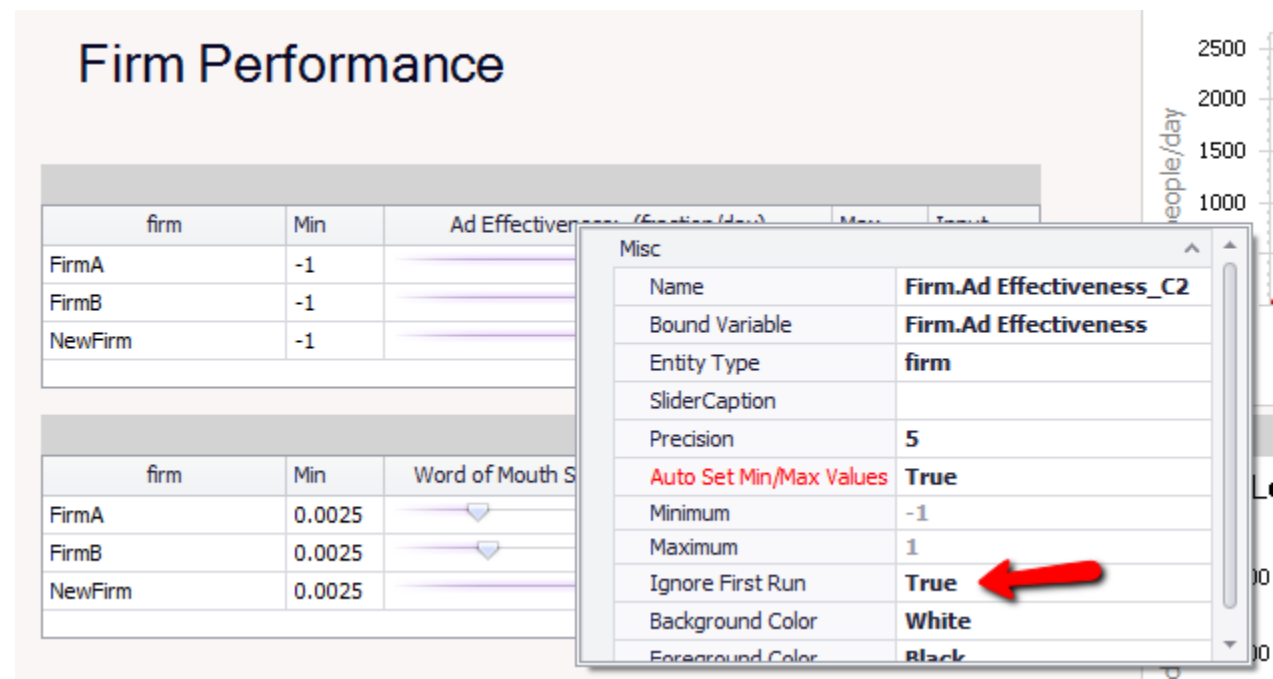
4c. Base vs. Policy Runs & "Ignore First Run"

- In the Run Control, use the **Duplicate** button to copy the base run, and rename the new run "policy" (the new time range should match "base")
- For the Firm Performance sliders, set "Ignore First Run" to True

Run Control



	Enabled		Entity Initialization Data	Time Series Data	Save List	Using Calendar Time	Initial Time
	☒	base	Use active dataset	Use active dataset	None (Saves Everything)	☒	
	☒	policy	Use active dataset	Use active dataset	None (Saves Everything)	☒	



4d. Setting Base to a low-key style

- Run the model
- Select View>Data Styles
- Switch to the Data Styles pane
- Set the line style for “base” to something unobtrusive

