



Does Technology Disruption Always Mean Industry Disruption?

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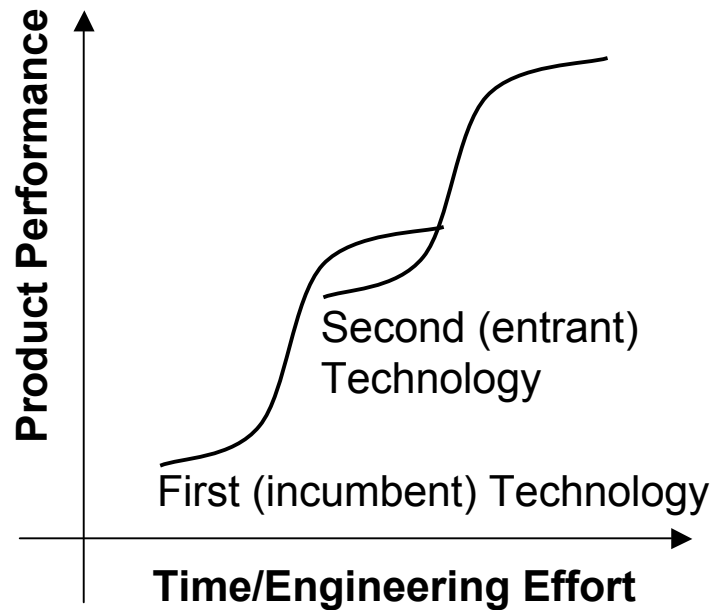
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Christensen's Conditions for Disruptive Technology

Firm	Price	Primary Performance (Basic Features)	Ancillary Performance (Additional Features)
Incumbent	High	High	Low
Entrant	Low	Low	High



Example Cases:

Mini mills
Disc Drives

*Ref: The Innovator's Dilemma,
Clayton Christensen (1997)*

Question: Are Christensen Conditions necessary and sufficient for industry disruption?



Technologies in Computer and Communications Industries

Potentially Disruptive Technology	Price Compared To Incumbent	Primary Performance Compared To Incumbent	Ancillary Performance Compared To Incumbent	
Open Source Software [Operating Systems]	LOW Often free	LOW Low initial reliability and ease of use	HIGH - Quick bug fixing - Code customization	Meets Christensen Conditions
WiFi Mesh Networks [Wireless Operators]	LOW Cheaper to build and operate	LOW Low mobility	HIGH - Higher speed - Wireless-Wired interconnection	Meets Christensen Conditions
P2P Service Providers [Long Distance Call Providers]	LOW Often free	LOW Low reliability	HIGH -Voice, Text, Video convergence	Meets Christensen Conditions

Do they meet Christensen Conditions?

Have they displaced the existing industrial order?



Industry Structure in Computer and Communications Industries

Potentially Disruptive Technology	Industry Structure (2000)	Industry Structure (2007)	Key Observations	
Open Source Software [Operating Systems]	<ol style="list-style-type: none"> 1. Microsoft 2. IBM 3. CSI 4. Oracle 5. HP 	<ol style="list-style-type: none"> 1. Microsoft 2. IBM 3. Oracle 4. SAP 5. Symantec 	Microsoft still has 90% of the OS market	No Industry Disruption
WiFi Mesh Networks [Wireless Operators]	<ol style="list-style-type: none"> 1. Verizon 2. SBC 3. AT&T WL 4. Sprint PCS 5. Nextel 	<ol style="list-style-type: none"> 1. AT&T 2. Verizon 3. Sprint-Nextel 4. T-mobile 5. Alltel 	-AT&T and T-Mobile own 1/3 US hotspots -Nokia, Samsung, lead Wireless-WiFi handset market	No Industry Disruption
P2P Service Providers [Long Distance Call Providers]	<ol style="list-style-type: none"> 1. AT&T 2. WorldCom 3. Others 4. Sprint 	<ol style="list-style-type: none"> 1. AT&T 2. Verizon 3. Comcast 4. Time Warner 5. Charter 	-Broadband providers own parts of access market -P2P Service big in Korea and Japan	Major Industry Changes

What factors influence such variation in outcome?

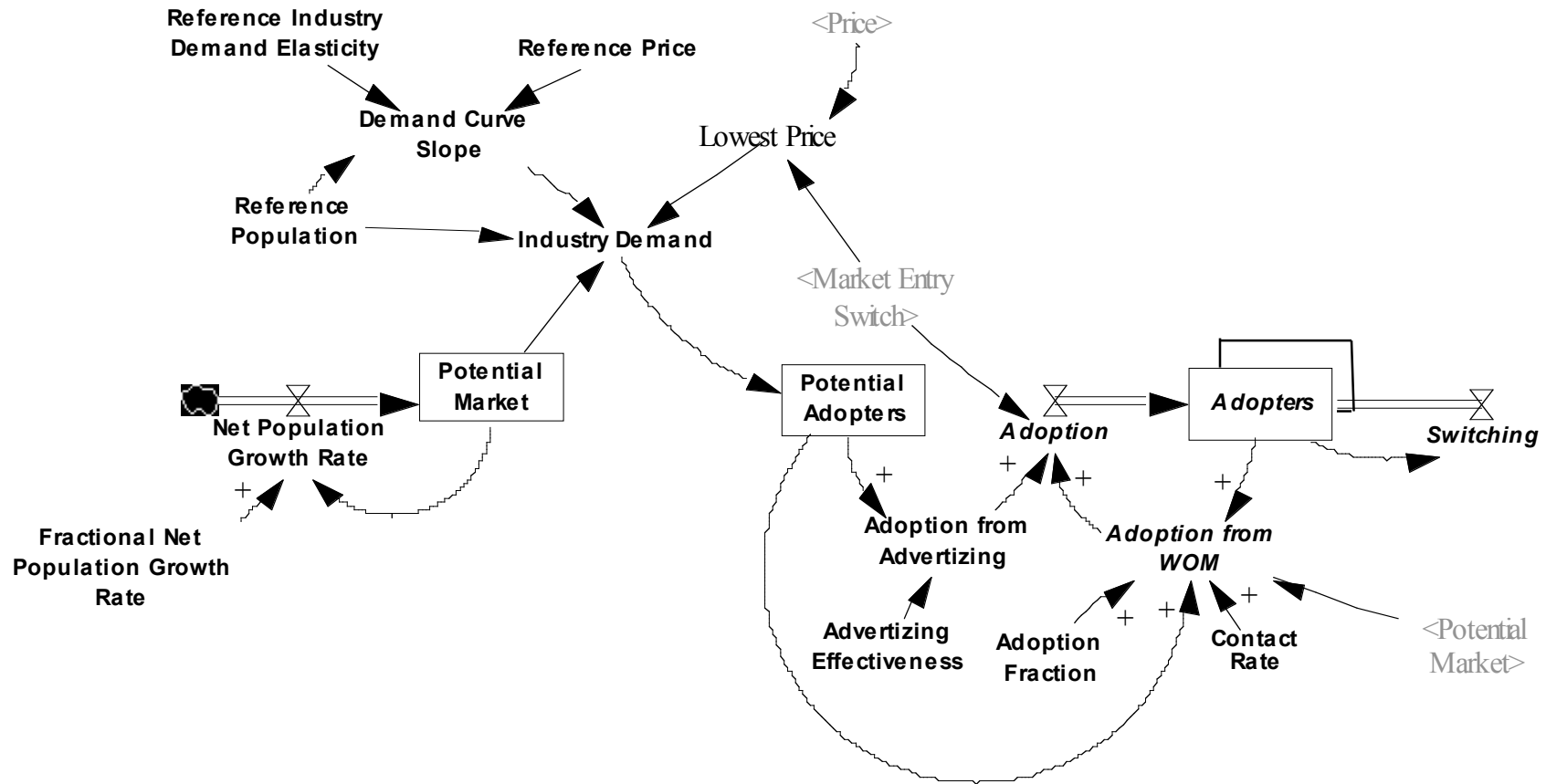


Model Setup and Assumptions

- A behavioral model (akin to behavioral game theory model)
- 2 Firms – Incumbent, Entrant
- 20 year period (think technology paradigms...)
- Incumbent enters at Year 0
- Entrant enters at Year 6 (when incumbent is mature)
- Firms initialized with Christensen's conditions...
 - Entrant has half Cost base than Incumbent
 - Entrant has half Initial Primary Performance than Incumbent
 - Entrant has double the Initial Ancillary Performance than Incumbent
- Both firms endowed with a total attention (resources) = 1
- Each firm allocates resources to Primary and Ancillary Performance only
- Consumers are homogenous in their preferences

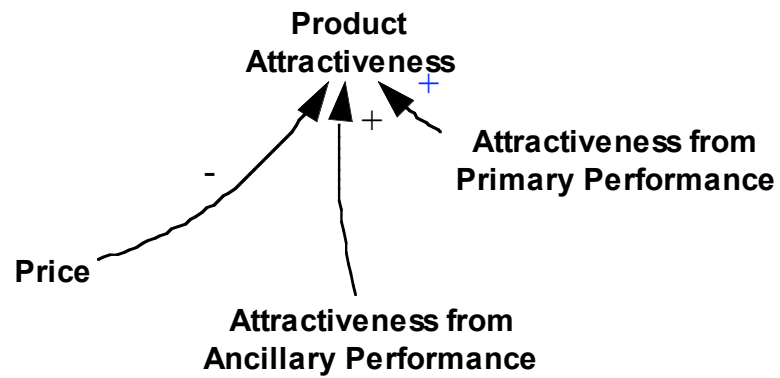


Adoption and Industry Demand



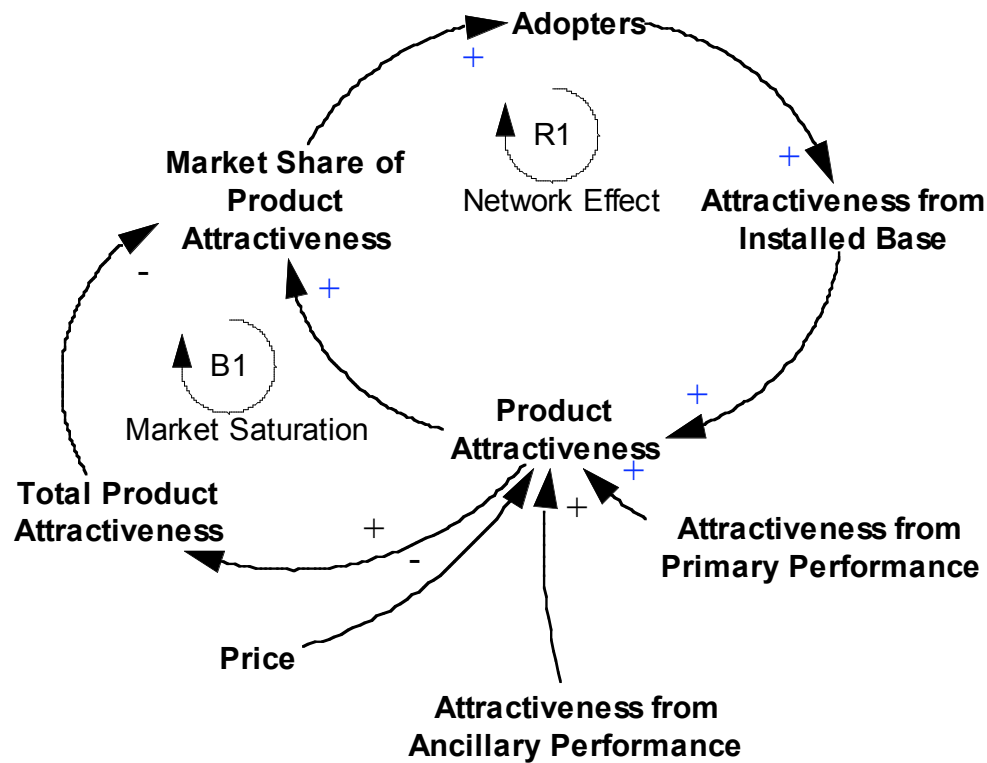


Consumer Preference and Behavior



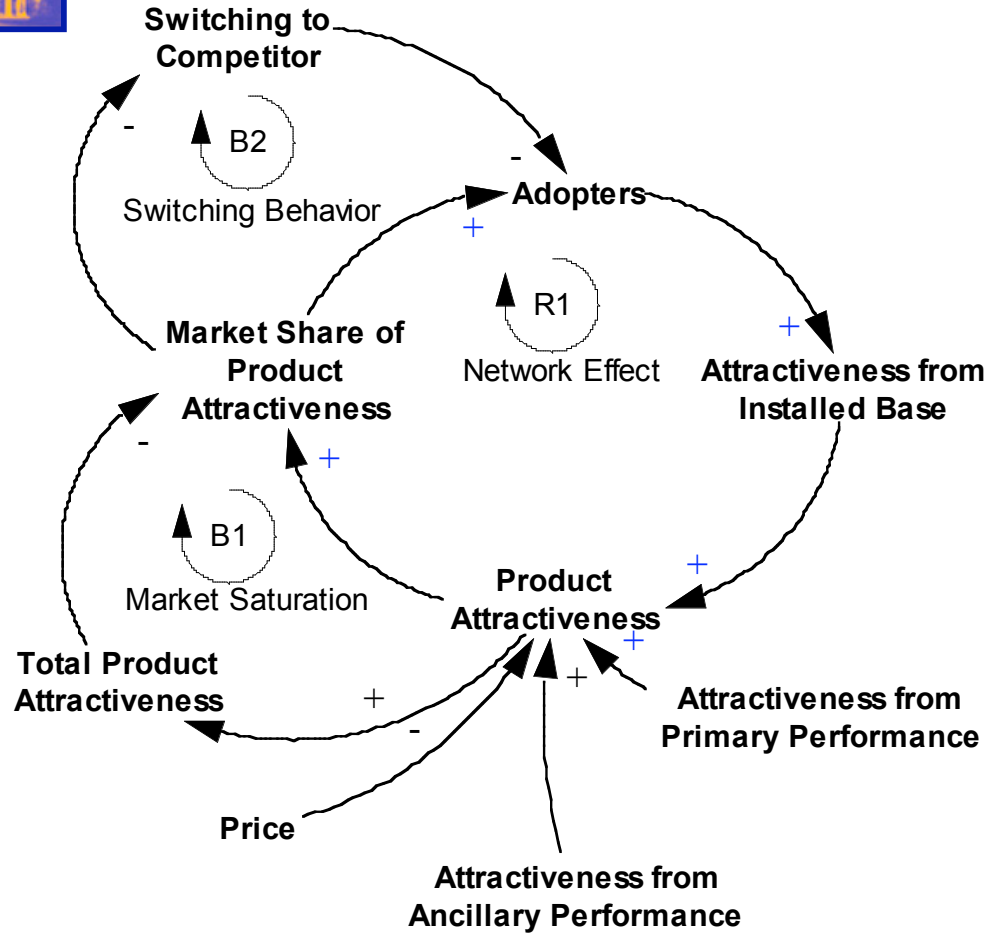


Consumer Preference and Behavior





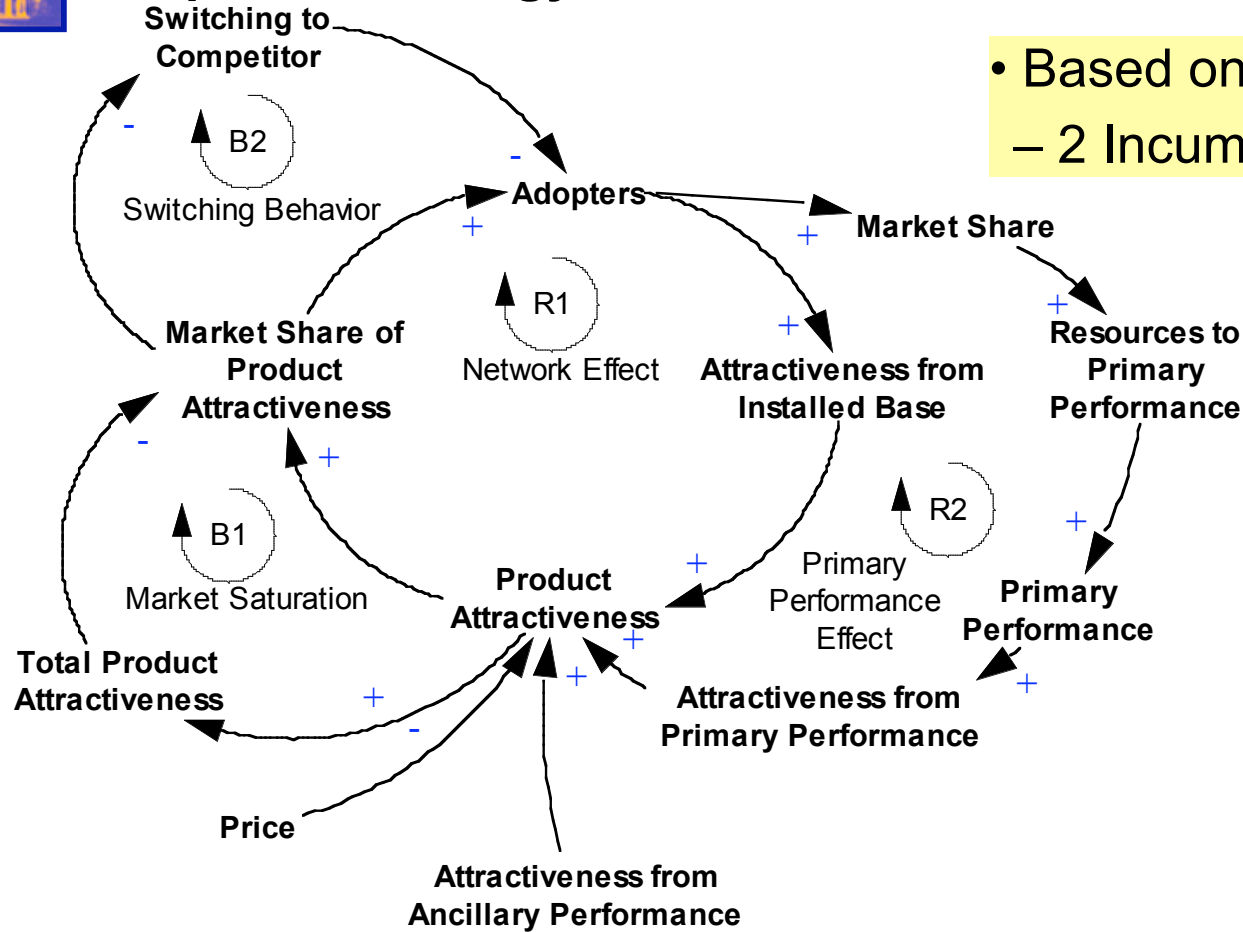
Consumer Preference and Behavior





Corporate Strategy: Incumbent's Initial Focus

- Based on 4 Interviews
– 2 Incumbents, 2 Entrants

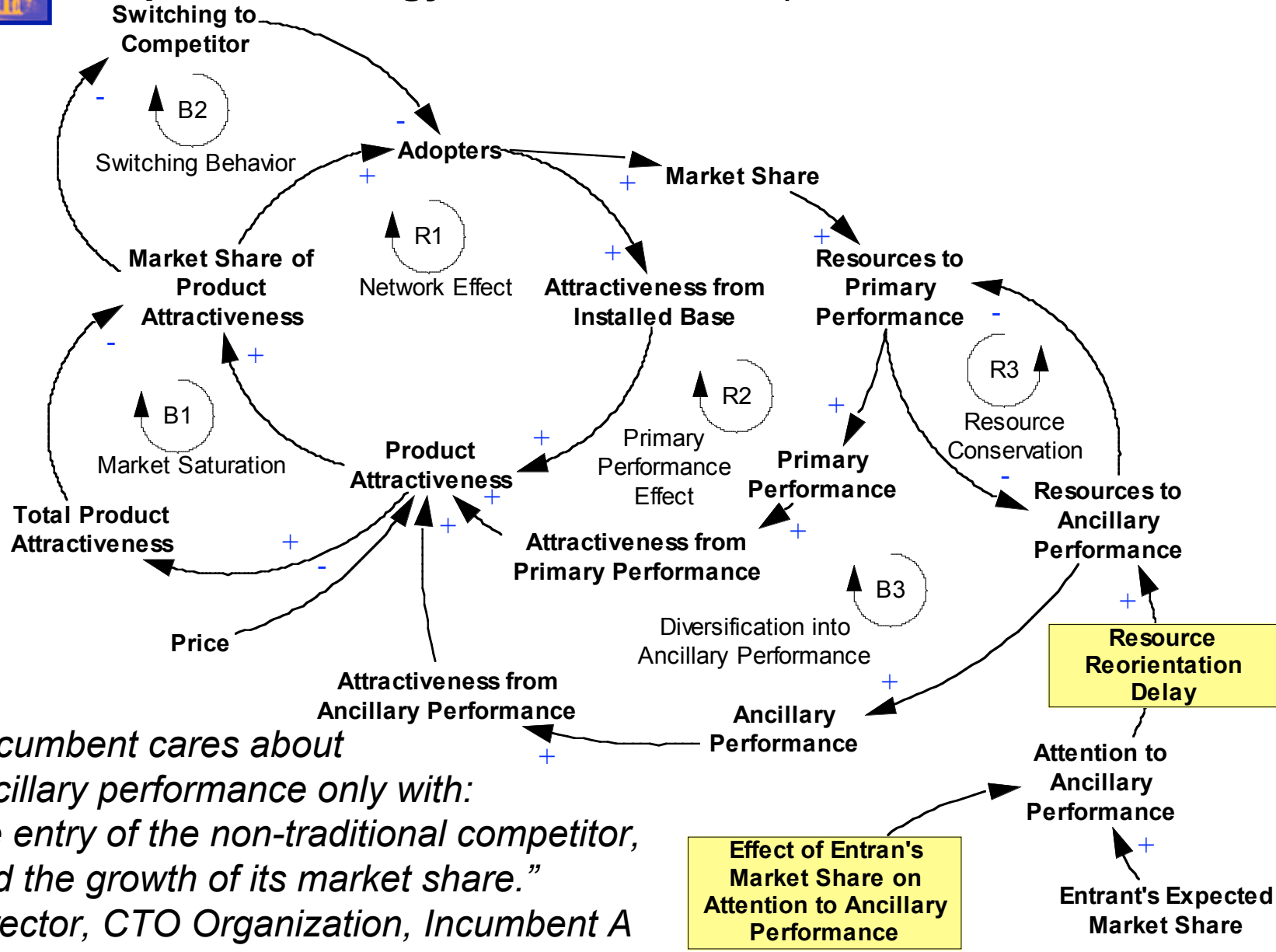


“The only strategy was that of a monopolist. Incumbent A did not care what Other features you want!” Director, CTO Organization, Incumbent A





Corporate Strategy: Incumbent's Response to Entrant

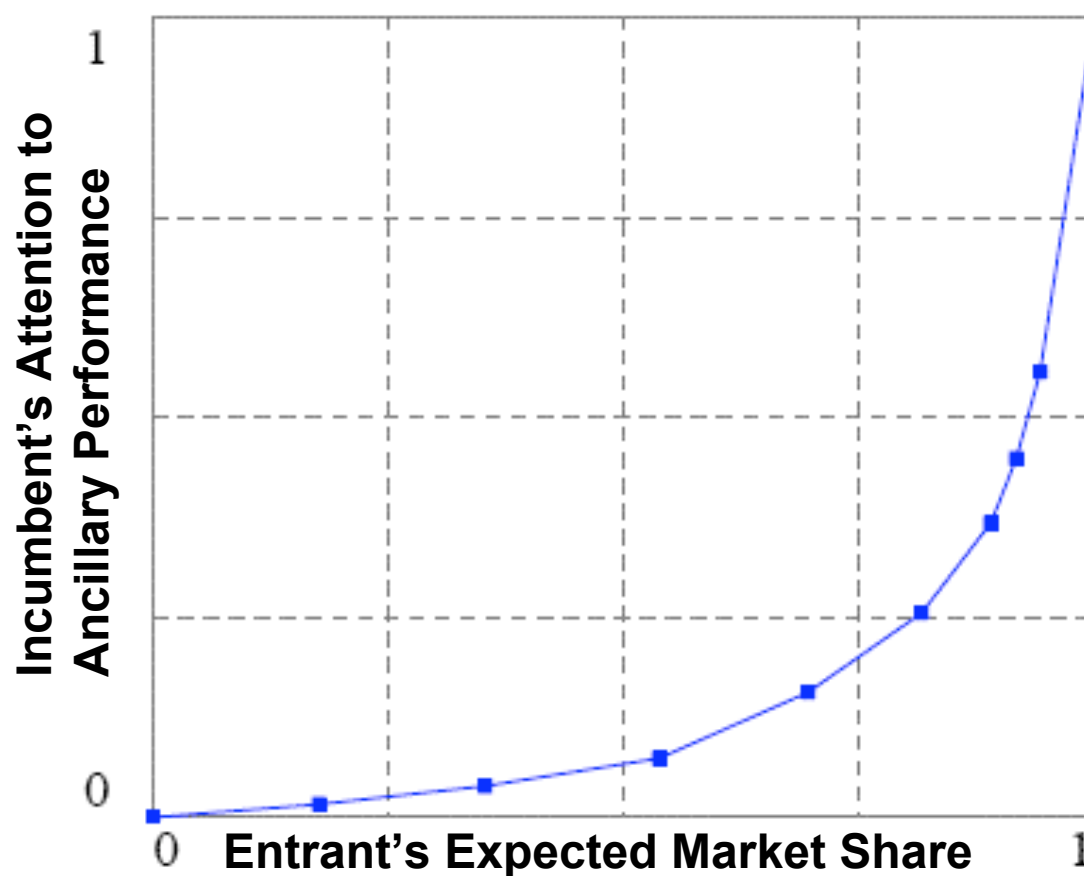


“Incumbent cares about ancillary performance only with: the entry of the non-traditional competitor, and the growth of its market share.”
 Director, CTO Organization, Incumbent A





Effect of Entrant's Market Share on Attention to Ancillary Performance



“First [when the entrant enters] the question is whether this is a price game or a performance game. Then, you realize that the future is ancillary.”
Chief Strategist and Architect, Incumbent B



Resource Diversification

	Resources to Ancillary Performance	Resources to Primary Performance
Incumbent	SMOOTH (Attention to Ancillary Performance, Resource Reorientation Delay)	1 – Resources to Ancillary Performance
Entrant	0.8	1 – Resources to Ancillary Performance

Resource Reorientation Delay

“First you have to write a report, then convince the leadership, and then the people who will work on it.” Director, CTO Organization, Incumbent A

Entrant’s Resources

“After the prototype phase, 80% attention is on developing new features (ancillary performance) and 20% on scale and reliability (primary performance).” CTO, Entrant A

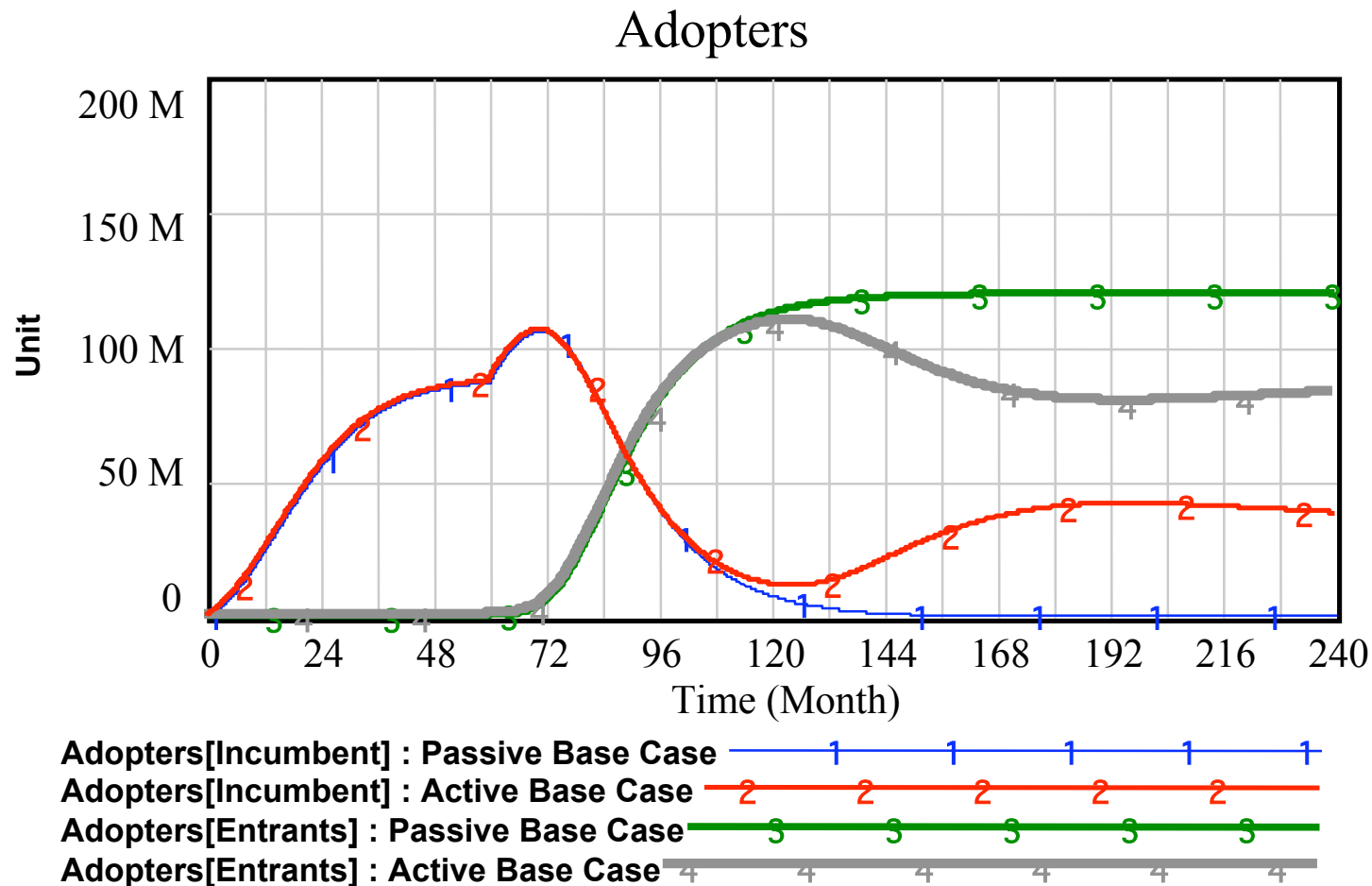
“New features is our forte. We are not going after the incumbent. The primary performance will come as a byproduct.” CEO, Entrant B.



Base Case Behavior

Passive Base Case - Incumbent does not respond to threat

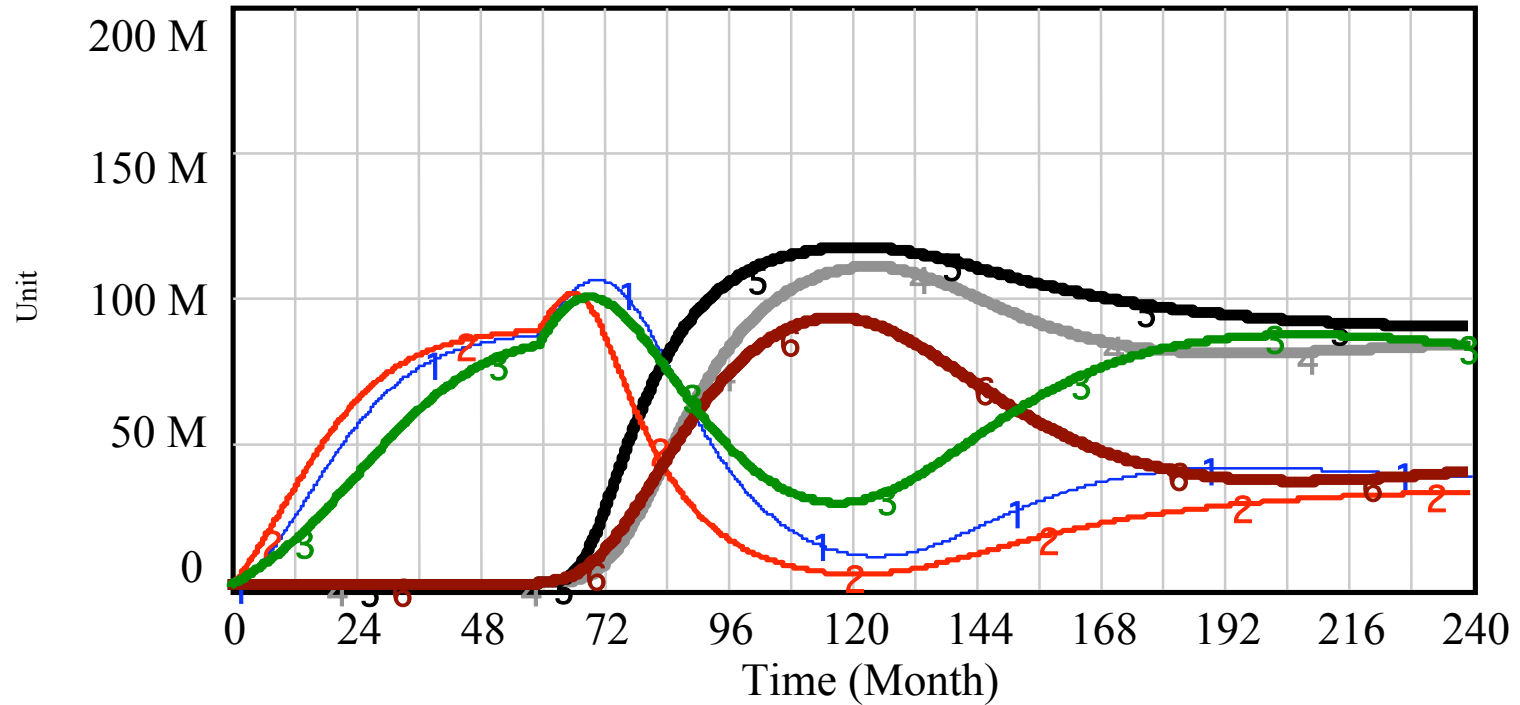
Active Base Case - Incumbent responds to threat



Note: We have created the basic reference mode



Technological Uncertainty: Primary Performance Acquisition Delay Adopters



Adopters[Incumbent] : Active Base Case 1
 Adopters[Incumbent] : Primary Performance Ack Short 2
 Adopters[Incumbent] : Primary Performance Ack Long 3
 Adopters[Entrants] : Active Base Case 4
 Adopters[Entrants] : Primary Performance Ack Short 5
 Adopters[Entrants] : Primary Performance Ack Long 6

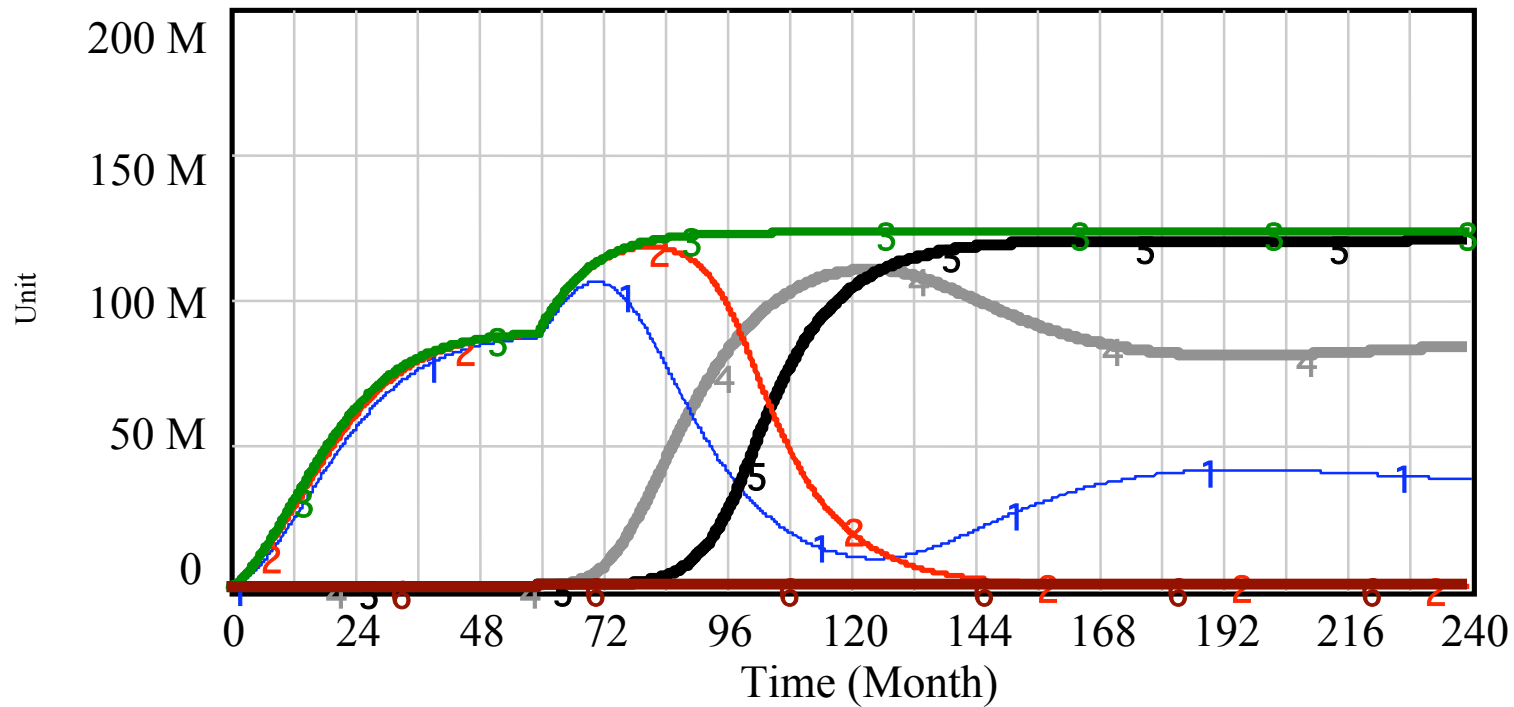
Technological uncertainty can help either the incumbent or the entrant





Market Uncertainty: Network Effect

Adopters



Adopters[Incumbent] : Active Base Case 1
 Adopters[Incumbent] : Network Effect Lo 2
 Adopters[Incumbent] : Network Effect Hi 3
 Adopters[Entrants] : Active Base Case 4
 Adopters[Entrants] : Network Effect Lo 5
 Adopters[Entrants] : Network Effect Hi 6

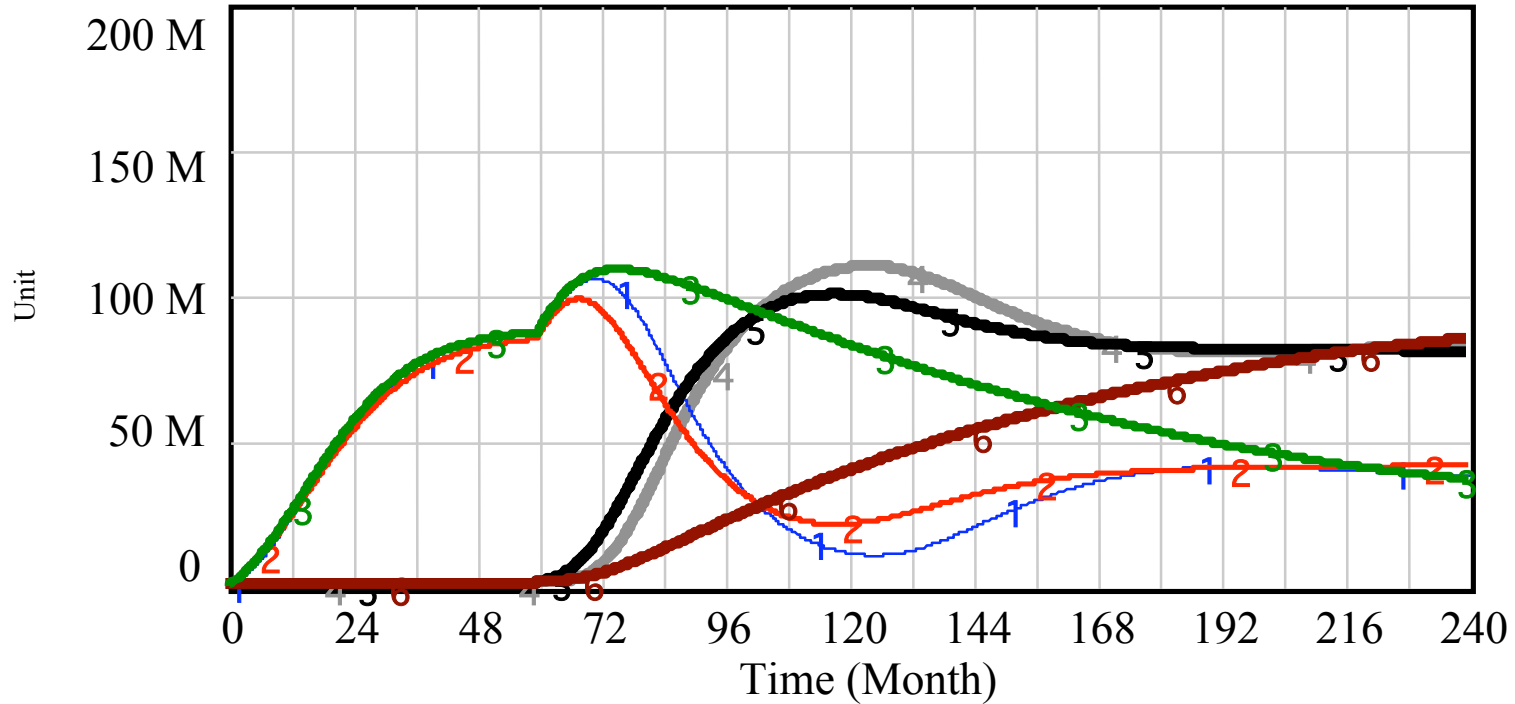
With network effects the equilibrium can be winner take all (WTA).
 The strength of network effect determines the winner





Market Uncertainty: Switching Costs

Adopters



Adopters[Incumbent] : Active Base Case 1
 Adopters[Incumbent] : Switching Cost Exogenous Lo 2
 Adopters[Incumbent] : Switching Cost Exogenous Hi 3
 Adopters[Entrants] : Active Base Case 4
 Adopters[Entrants] : Switching Cost Exogenous Lo 5
 Adopters[Entrants] : Switching Cost Exogenous Hi 6

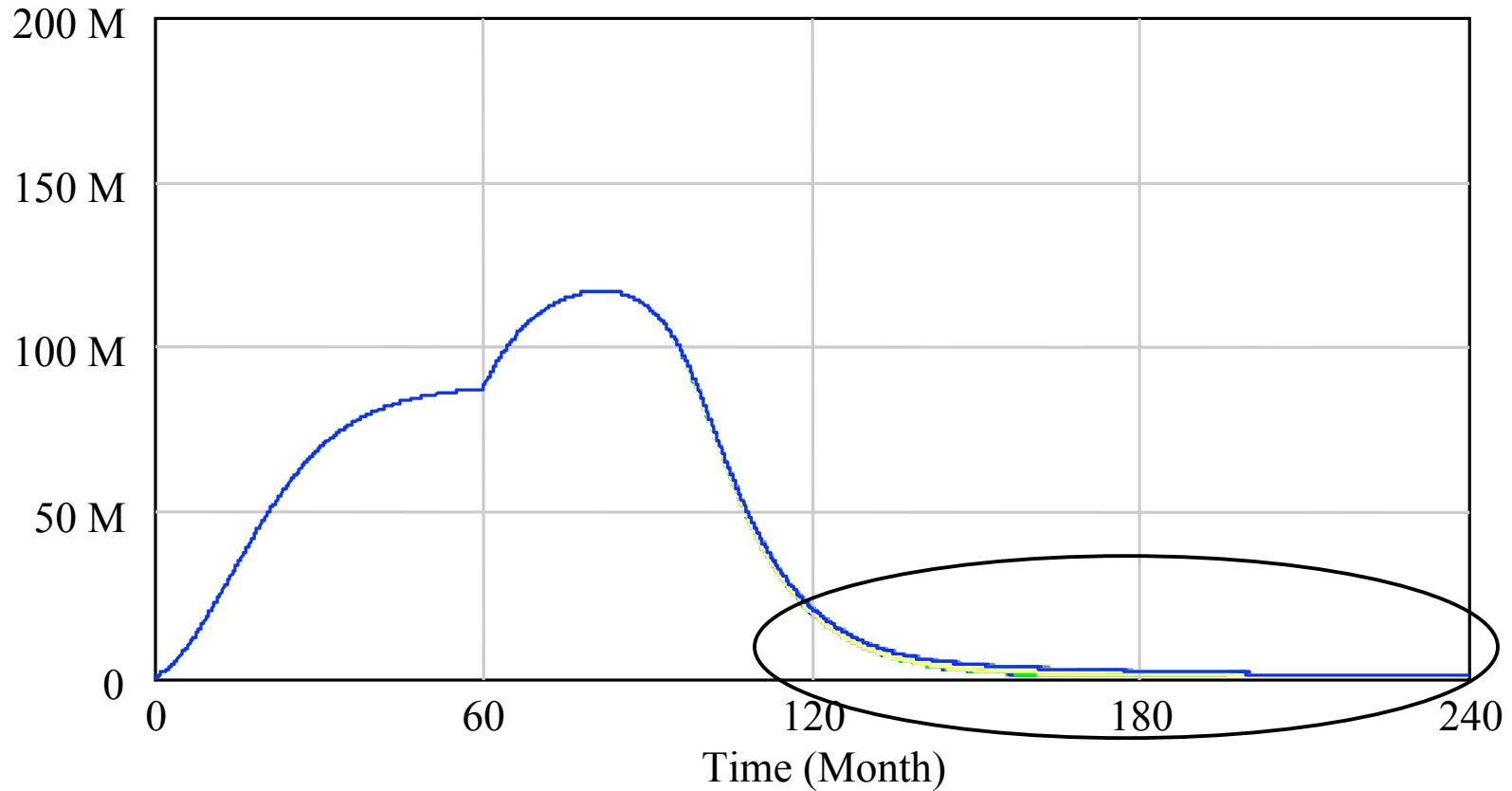
Higher the switching costs the longer the incumbent retains the market. Longer retention buys time to reorient resources.



Organizational Uncertainty: Resource Reorientation Delay

50%  75%  95%  100% 

Adopters[Incumbent]



The nature of technology and market matter more than firm's agility.
This is for future work...



Conclusion

Technology Disruption Does Not Always Mean Industry Disruption!

Technology disruption may not change the existing industrial order despite meeting Christensen's Conditions when...

- The incumbent can maintain the lead in Primary Performance while improving their Ancillary Performance
- Strong Network Effects are present
- The incumbent can influence the Switching Behavior

Our research argues for broadening the research agenda around understanding industry disruption



Thank You!

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