

CDBG-DR Housing Recovery: From Approval to Completion

A System Dynamics Model of Post-Harvey Houston

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Approvals, funding, and contractor capacity together determine how many homes can enter construction. Increasing the number built per contractor each month helps the program reach **1,500 completed homes** sooner.

Introduction

Community Development Block Grant-Disaster Recovery (CDBG-DR) finances housing reconstruction after disasters. Administrative delays and limits on funding or construction capacity can extend the time needed to complete homes. We examine Houston's Hurricane Harvey program using a system dynamics model to assess how processing times and contractor productivity affect recovery.

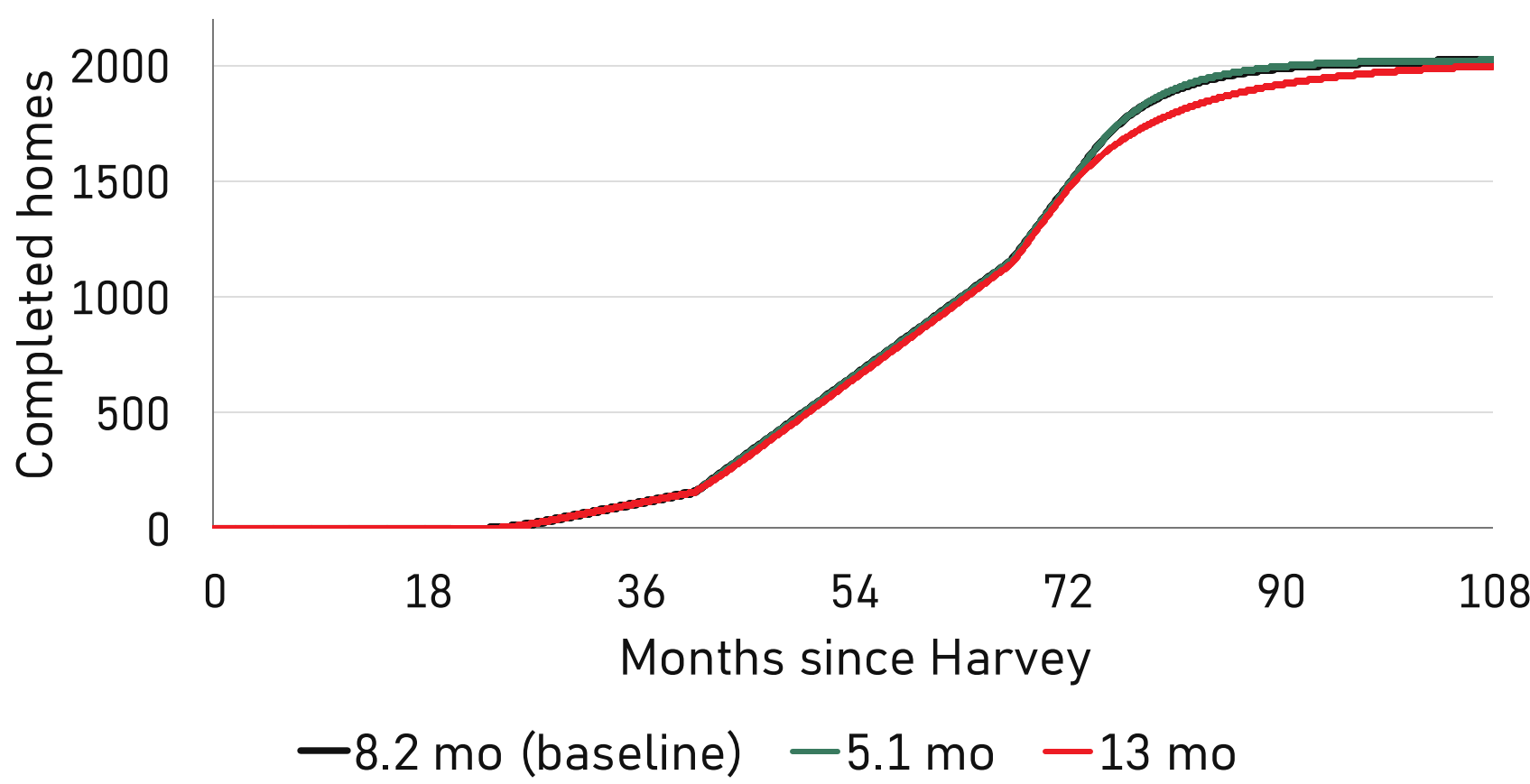
Model structure

- 1 Administrative process.** City and Texas General Land Office (GLO) queues govern approvals and other closures.
- 2 Funding.** Funds and cost per home limit construction starts.
- 3 Construction capacity.** Labor, materials and contractor productivity limit output.
- 4 Physical reconstruction.** Approved cases enter construction and complete after a building delay.

Results

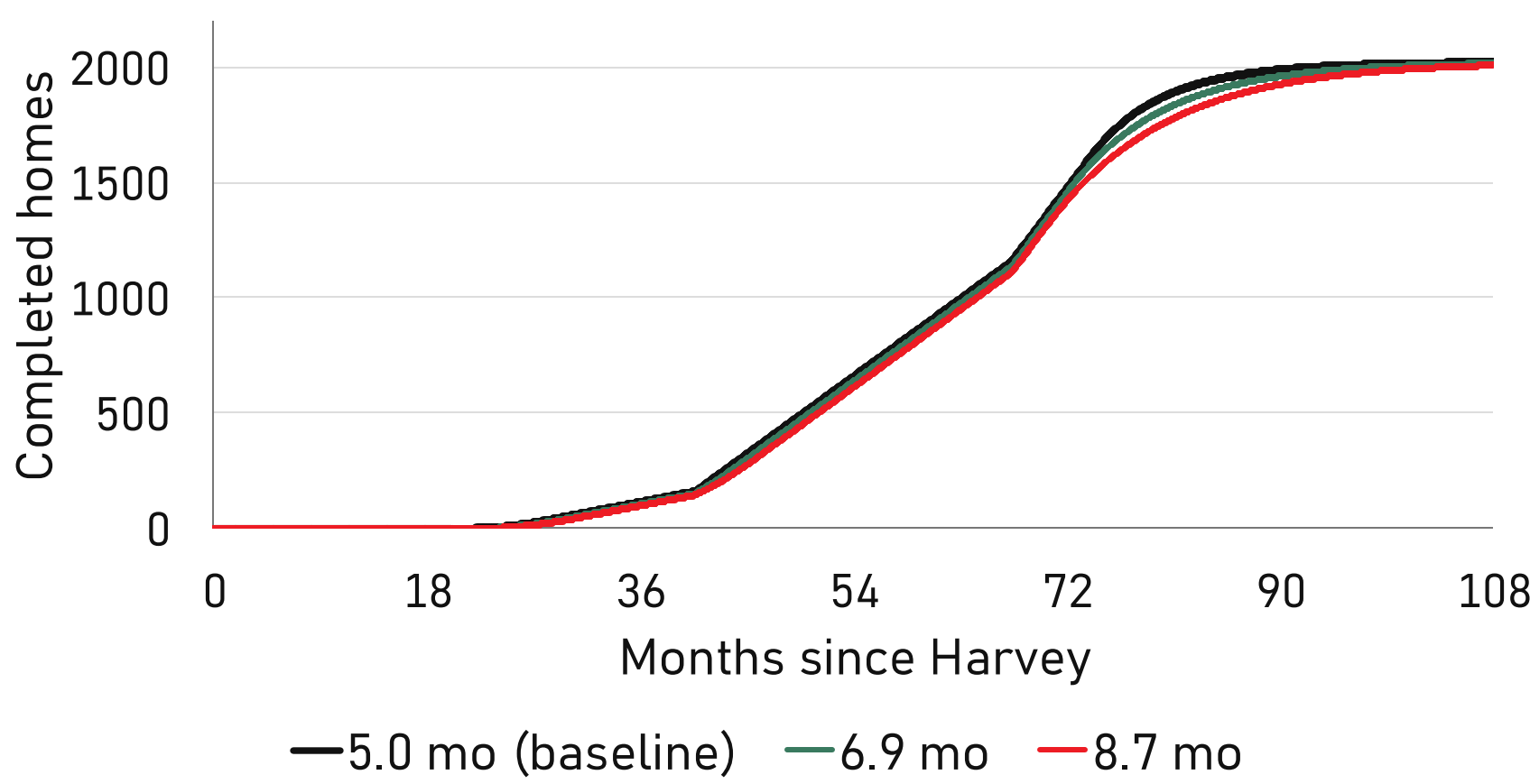
The baseline simulation yields 1,944 completed homes at month 84 and 2,024 at month 108 within the modeled program.

A. State application processing



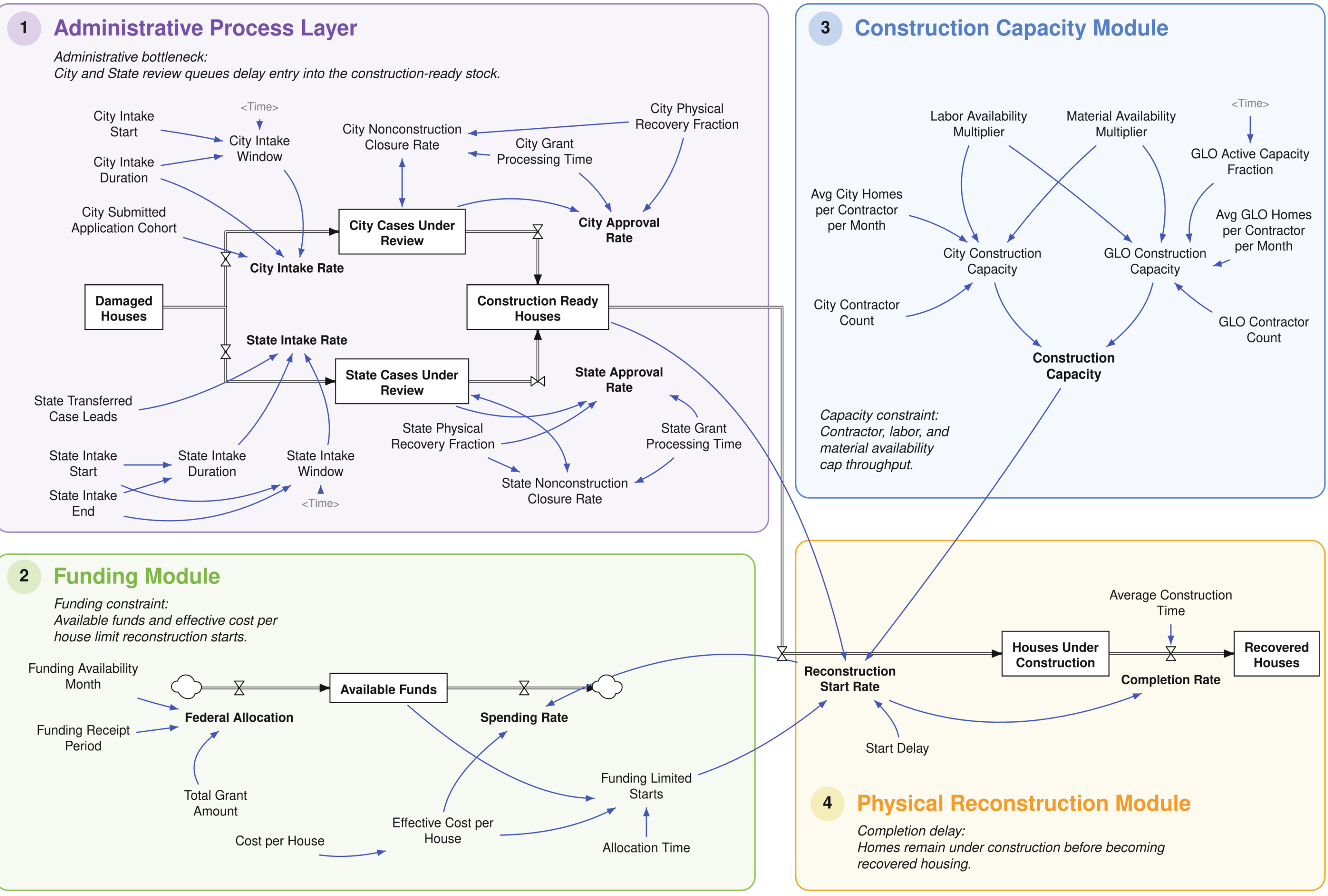
Extending State review to 13 months reduces month-84 completions by 93. At 5.1 months, the gain is 6. This asymmetry is consistent with downstream constraints.

B. Preconstruction start delay



Delays of 6.9 and 8.7 months yield 47 and 97 fewer completions at month 84 than the 5-month baseline. Slower queue discharge delays construction.

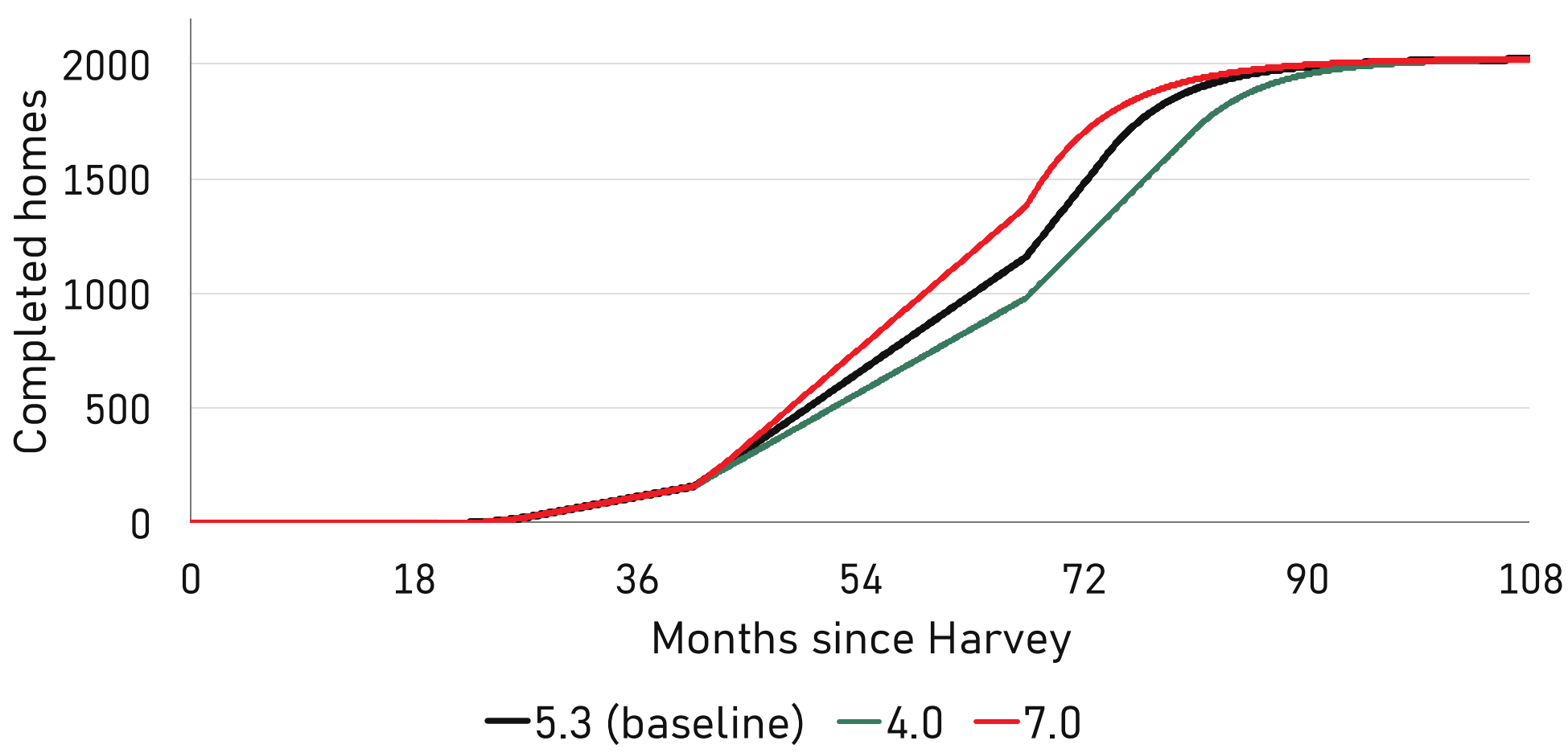
System Dynamics Model



Simulation design

The Vensim model covers 108 months (nine years) after Harvey (August 2017), including start-up delays and reconstruction. Sensitivity tests vary State review time, preconstruction delay, and contractor productivity individually, with other inputs fixed. Raising productivity from 4 to 7 homes/contractor/month advances 1,500 completions from 76.9 to 68.7 months, with similar final totals.

GLO contractor productivity



Productivity: homes per contractor per month

Conclusions

- Recovery depends on coordinating administrative review with the funding and capacity available for construction.
- In the tested scenarios, contractor productivity changes recovery timing more than final completion totals.
- Joint scenarios will assess whether faster review and greater construction capacity produce complementary gains.

Acknowledgement

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Selected References

- [1] Texas GLO (2026). Hurricane Harvey State Action Plan, Amendment 22.
- [2] GAO (2022). GAO-23-105295, Table 24, p. 90.
- [3] Texas GLO (2025). HAP Application Pipeline, p. 2.
- [4] Texas GLO. Harvey Quarterly Performance Reports, selected Houston housing activities.
- [5] City of Houston (2021). Harvey Recovery Pipeline Report 23.