

HKUST ECON Seminar

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Writing Code vs. Shipping Code: Productivity Effects Across Generations of AI Coding Tools

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Abstract:

We study how productivity effects evolve across successive generations of AI coding tools and across stages of the software production process, using data on more than 100,000 GitHub developers combined with internal telemetry. In an event-study design with matched controls, we find that each successive generation of AI coding tools—autocomplete, interactive coding agents, and autonomous coding agents—significantly increases coding activity, with respective cumulative effects of 50%, 140%, and 180%. However, these effects attenuate sharply across production stages: for lines of code, the effect is 1,480%, but falls to 180% for commits, and 36% for releases. We show that this pattern is consistent with a multi-stage production process in which AI automates code generation but downstream tasks—review, integration, and coordination—remain human-bottlenecked. Aggregate data from three software marketplaces corroborate this result: large developer-level gains in task productivity only translate into modest increases in software output.