Trac(k)tors of Change: Monitoring, Tractor Mobility and Agricultural Mechanization in Kenya*

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Abstract

Private rental markets can help small-scale producers in developing countries overcome capital indivisibilities and adopt productive technologies, yet they remain limited in scope. This paper studies the role of monitoring problems on the supply side of tractor rental markets in Kenya, where moral hazard between tractor owners and operators discourages owners from sending tractors to remote areas, limiting the efficient spatial allocation of scarce capital and, thus, access to mechanization. To study this mechanism, I evaluate the impact of a new GPS tracking app that allows owners to monitor their operators remotely, combining unique tractor GPS data from around 1,200 tractors and 900,000 georeferenced fields, satellite data and an original farmer survey with a quantitative spatial model. After adoption, monitored tractors gradually expand their range of operations and reallocate toward areas where potential returns to mechanization are higher, consistent with a reduction in the monitoring cost and a more efficient spatial allocation. Further, fields visited by monitored tractors experience larger increases in remotely-sensed vegetation growth than similar nearby fields, suggesting productivity gains at destination. Finally, I develop and estimate a quantitative spatial model of tractor location choice that incorporates monitoring cost to quantify the aggregate gains from the technology. The results indicate that digital monitoring raises output by 2%, reducing spatial misallocation by 15%, and is more cost-effective than an equivalent subsidy.

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